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PRINCIPLES OF TAXATION.

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"*The principles of good government are far from easy to learn accurately; and very much harder to put in practice.*"—F. B. SANBORN.

INTRODUCTION.

IT is the purpose of the writer in the chapters which follow, to discuss the principles of taxation from a broader basis and by different methods than have heretofore been attempted, special consideration being given to the experience of the United States.

Such a discussion primarily involves the inquiry, of how far the varied and curious experience of nations leads up through what may be regarded as a process of evolution, to a recognition of the underlying and essential principles of a just and at the same time an efficient system of taxation. And it also necessitates, for the attainment of correct conclusions in the prosecution of such inquiry, that illustrations drawn from the world's great record of experience should take precedence of theory, especially in the way of example and exhibit of the many abuses of the power of taxation which the ignorance of legislators and the cupidity of designing men have inflicted upon nations.

The subject is one of transcendent importance, perhaps more universally important than any other that can invite public attention. Its discussion opens questions of the widest possible range. There can be no civilization without government and no government without an adequate supply of revenue obtained from the persons and property of the people governed. There can be no health in the body politic without sound finance, and no sound finance without a sound system of taxation. In fact,

taxation is to our body politic what blood is to the body physical: if healthy, infusing life and warmth; but if unhealthy, the agent for producing discontent, decrepitude, and paralysis.

The absence or existence of limitations on the power of a government to make compulsory levies on the property or persons of its people for its use or support, constitutes the dividing line between a despotism and a free government—a fact most pertinent to legal, economic, and societary studies which has attracted little attention.

The methods and scope of what is called taxation regulate more than all other agencies the distribution of wealth, which is really the great question of the future to all nations. Ever since Adam Smith wrote his paramount work on the Wealth of Nations the political economists and students of social science have concerned themselves mainly with the production of wealth. That problem has been practically solved. Wealth is now produced with a rapidity that the world had never before supposed possible,* and the laws governing its production have become well understood by those who have made a special study of the subject. An inevitable result of this condition of affairs has been, that wealth produced under the greater control that man in general has obtained over the forces of Nature has aggregated itself, as it always will, in the hands of those whose faculties especially qualify them to obtain and manage it, and who, in common parlance, have received the name of "*money-getters.*" These have become enormously rich, while the masses, whose material condition is also absolutely much better than at any former period of the world's history, are, however, relatively poorer. Improved facilities for transportation have greatly facilitated intercommunication,† and the opportunity thus afforded for the observation of extreme contrasts in individual conditions has operated as a very great factor in occasioning discontent among the masses, who by reason of the

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* Recent investigations indicate that the absolute effective force available to the American people for the production of wealth is more than three times greater at the present time than it was in 1860. The outflow of British capital for investment in foreign securities and negotiated in London alone, during the eight years next previous to 1890, has been estimated by those best qualified to express an opinion, to have amounted to the large sum of nearly or quite $700,000,000 per annum. And this estimate does not comprise all the British capital loaned to foreign countries, but only such as was subject to public cognizance.

† The number of people annually transported on the railroads alone in the United States exceeds many times the total population of the country, the annual number for the New England States being more than sixteen times greater than their population. The widening of the sphere of one's surroundings, and a larger acquaintance with other men and pursuits, have long been recognized as not productive of content. Writing to his nephew more than one hundred years ago, Thomas Jefferson thus concisely expressed the results of his own observation: "Traveling," he says, "makes men wiser, but less happy. When men of sober age

never as yet fully tested experiment of universal suffrage, have become, at least theoretically in the United States, the sole arbiters of the policy of their Government and of the selection of the legislators who are to enact laws in conformity with such policy.*

The problem of the acquisition of wealth having thus been solved, that of the proper distribution of wealth logically and necessarily follows, and the character of the measures which directly or indirectly involve what is called taxation for the attainment of such result, which seem to commend themselves to the people of the United States, are especially worthy of attention. They are indicated in part by the adoption of a pension system unlike anything of the kind ever known in history, and which necessitates an annual expenditure of money (raised by taxation) to meet the military expenses of the country—army, navy, and pensions—in excess of that entailed by the immense military establishment of any of the countries of Europe, and the enactment of an income-tax statute whose primary object was not to raise revenue for the support of the Government, but an unmistakably political and socialistic measure, which threatened to annul the most important and exceptional feature of the Federal Constitution.

That the diminishing rate of returns, in way of interest or profits, by the force of laws which no combination of capital can resist, is seriously impairing the relative value of wealth, and may eventually reach a minimum which will greatly diminish the inducement to individuals to economize or save it, although not generally recognized or appreciated, can not be denied. And neither is it recognized that the current rate of taxation on capital in all civilized countries even now approximates, and to an extent actually exceeds, the current rates of interest or profit on its use. Thus, for example, the rate of discount at the Bank of England during the greater portion of the years 1894 and 1895 has not been in excess of two per cent, and the discount (borrowing) rate for three months during this period was not infrequently less than a rate of three quarters per cent per annum. If taxes, according to popular theory, do not diffuse themselves, but remain a burden on the person, business, and property subject to their

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travel they gather knowledge, but they are, after all, subject to recollections mixed with regret; their affections are weakened by being extended over more objects, and they learn new habits which can not be gratified when they return home."

* "The great, the unanswerable argument in favor of universal suffrage is, not that it insures a better or purer government, but that all must be contented with a government in which all have an equal voice. If it be deficient in this particular, if it fail to protect the poor against the oppression of the rich, or the rich against a destruction of their property by the poor, it is *pro tanto* a failure, and another method of representation should be adopted."—*Address of Justice Brown, United States Supreme Court, before the Law Department of Yale University, July, 1895.*

first incidence, there is a problem likely to come at no distant day before tax legislators, which up to the present time they have hardly thought of, and which is certain under a free government to be solved by human nature rather than by statute.*

The scope and methods of raising revenue for the support of a State are also some of the greatest, if not the very greatest, determining factors of the morality of a people. "I insist," said an eminent lawyer and member of the Constitutional Convention of the State of New York in 1868, "that a people can not prosper whose officers work and tell lies. There is not an assessment roll now made out in this State that does not both tell and work lies." And no member of the convention, or any representative of the press, either then or subsequently, has challenged the assertion. The extent also to which the existing system of taxation in the United States has obliterated the sense of honesty in its people in their individual dealings with the Government, removed all repugnance to the act of perjury, and caused each one to justify himself to his conscience for making a false return in the matter of taxes, by the supposition that every one is doing the same, is also strikingly illustrated by the circumstance, that a high court in one of the States of the Federal Union has recently decided that "perjury in connection with a man's tax lists does not affect his general credibility under oath."

The idea that the proper relation of a State to its people is essentially of a paternal nature finds much of popular approval, and is without doubt popularly desired. Accepting this idea as correct, let us exemplify it in its application to the State. Suppose a father in dealing with his family, placed, so far as his children are concerned, a premium on lying and concealment, and vested with a heavy penalty all truthfulness and straightfor-

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* M. Léon Say, the distinguished French economist, in a recent discussion of the income tax, asserts that the public and private financial history of France has been one of incessant abolition of private and state debts, and in substantiation of such a conclusion he shows that if a capital of 8,330 francs had been invested in national debt obligations of France in 1522 and allowed to remain subject to the various changes in respect to capital and interest which the financial policy of the state has necessitated and required under its successive governments, the present value of the investment to the legitimate heirs of the first investor would be but 83 francs.

The reduction of annual income to the holders of the national debts of Europe, contingent on the refunding of the same during the year 1894, is estimated at $24,000,000, requiring an addition of $960,000,000, with an earning capacity of two and a half per cent per annum, to the total of what is called capital, to make up for the subtraction of income from the individual holders of such securities in the previous year. In the United States the shrinkage in the amount of annual dividends paid on the capital stock of its railroads between the years 1892 and 1894 is reported as in excess of $14,000,000, and in the annual interest on bonds during the same period at $13,000,000, or a total greater than the losses contingent on the whole refunding operations of the states of Europe during 1894.

ward dealing, he would be regarded as a worthy inmate for the States prison. But this is exactly what the Government of the United States does, or proposed to do, in the case of many of its so-called tax statutes. Thus in the recent income-tax statute it offered to its citizens considerations in money if they would forswear themselves, or practice deception; and it imposed a direct and heavy fine on those who were conscientious and truthful. Again, when the Government imposes a tax of more than a thousand per cent in excess of the prime cost of the article taxed, as it did in 1864 in the case of distilled spirits (whiskey), it offered a premium for the perpetration of fraud that human nature as ordinarily constituted could not resist. Could any course of action, if deliberately intended, be more demoralizing to a people? Do not these experiences go far in support of the theory that if a people desire to have a paternal government it would be wise to choose a despotic form, inasmuch as all experience has shown that a republican or popular form of government is least fitted for such work? Give democracy a firm hold of the reins of government, and it is no easy matter, as the French Revolution of 1789 and the present fiscal condition of France exemplify, to restrain its excesses.

It should not furthermore be overlooked that that class of the community to whom the questions of morality and religion are especially intrusted, rarely, if ever, give this subject of taxation any attention. If any sermon has ever been preached in this country by any clergyman of any denomination on the moral and religious results of a defective system of taxation, the writer has never heard of it. One reason and apology for such conduct may be found in the circumstance that intelligent and reliable expositions of this subject are not readily accessible. Indifference or antagonism to the study of taxation is not, however, confined to the clergy. Minds trained in the law are not necessarily, and indeed rarely, trained thereby to esteem or intelligently discuss economic subjects. One of the most eminent members of the American bar recently remarked to the writer that, grant whatever measure of importance we may to economic principles and interests, they have no place in the legal profession, the business of which was, not to make or amend laws as expressed in enactments, but to interpret and determine their application. Hence the popularity at the American bar of the legal maxim *stare decisis*, which may be interpreted to mean, follow precedents, and do not attempt to invalidate the reasons and conclusions of the lawmakers. Such a theory and rule of practice would, however, close the door on reason and truth, and constitute an almost insuperable barrier to all social progress. If Lord Mansfield, when the negro slave Somerset came before him with a de-

mand that he be given his freedom, had followed precedents, he would have denied the application, for such precedents were opposed to it. But recognizing the change which an advanced civilization had effected in the government of the English people, and that the slave was held, to quote his language, "in virtue of positive law" (precedent), "which preserves its force long after the reasons and occasions from whence it was created are erased from memory," he granted the application; and incorporated into the policy of the English Government the principle of which the British people have ever since been proud—that no person can continue to be a slave after he has planted his foot on English soil.

Other obstacles, at present almost insuperable, in the way of establishing a correct system of taxation, are that the subject is not properly taught, if taught at all, in the higher institutions of learning of the United States and Great Britain; that up to the present time there is rarely if ever given a correct and scientific definition of the terms "tax" and "taxation," which makes it somewhat doubtful if those who talk about their meaning and incidents know what they are talking about; that there are no text-books on the subject generally accepted as authoritative; that there is no clear and settled understanding even as to what constitutes the main subject of taxation—namely, property; that the meaning of terms which have formed the basis of statutes and legal practice is entirely different in the United States and other leading civilized nations; and that, as a rule, professors of economic science in the United States have failed to recognize in their reasoning and teachings of this whole subject, that the Government of the United States, both Federal and State, differs in many respects, both in theory and practice, from any other government that has heretofore existed; and that therefore ideas and experiences which are regarded as the basis of sound policy in respect to taxation in the former are not accepted as such in the latter. Thus the United States, alone of the great nations of the world, regards debts and credits as property rightfully subject to taxation. The United States is also the only nation in which the taxation of exports is forbidden both to Federal and State governments under any circumstances. To no other government, furthermore, than that of the United States is applicable the following principle enunciated by the United States Supreme Court (116 United States Reports, p. 631) respecting the assessment and collection of taxes: "Any compulsory discovery, by extorting the party's oath, or compelling the production of his private books and papers to convict him of a crime or to forfeit his property, is contrary to the principles of a free government. It is abhorrent to the instincts of an American. It may suit the purposes of

despotic power, but it can not abide the pure atmosphere of political liberty and personal freedom." If this principle was recognized as the higher law in European states, it would be safe to say that the revenue collected from their income taxes would be exceedingly small.

It is also a very curious circumstance that an existing system of municipal or local taxation, which has proved itself to be most intelligent, satisfactory, and efficient for revenue, and most worthy of being studied as a model for adoption, has as yet almost entirely failed of recognition or consideration by any of the recent writers on taxation or authorities on general economic subjects on either side of the Atlantic.

Again, ignorance or willful disregard of the true principles of taxation in the United States has powerfully contributed to foster the idea among its people that they should look to Government for their support, rather than that the people should support the Government. The practical incorporation of this idea into the fiscal policy of the Government has enabled a comparatively few persons to accumulate vast fortunes, has built up class distinctions, promoted popular discontent, and established a precedent for state socialism. Figs, however, can no more be gathered from thistles than class legislation, whether it be the rich against the poor or the poor against the rich, can be looked to for the perpetuation of popular government or the spread of democratic virtues. The evil of bad taxation is not merely economic, it is moral, and no argument can change its character.

To defective elementary education, in respect to the principles of taxation, may also be attributed the almost universal disassociation in the minds of the masses between the payment of taxes and the benefit, or profitable return consequent upon such payment. The youth of the United States, and doubtless of all other countries, as he grows up, finds roads and bridges, schools, courts and churches, commercial regulation and police—in short, all national, State, or municipal machinery—provided for him almost as freely as air, sunshine, or water. He has but to live to experience their benefits or discomforts. At home these subjects, regarded as dry and abstruse, are rarely if ever selected as topics for social conversation, and, if casually brought up, are discussed merely in reference to their bearing upon the interests of this or that political party. The sons, therefore, of even refined and intelligent American families, so far as home education and influences are concerned, enter upon their duties as citizens, with votes and voices for determining the policy of their government, with not merely an entire ignorance of the principles or methods by which the cost of the benefits accruing from such policy are defrayed, but with a disinclination to receive instruction on the

subject. Each one, indeed, seems to argue to himself that "as government and society went on very well without thought or care of mine during the first twenty years of my life, they will undoubtedly so continue during my manhood." And if they eventually become public functionaries, their tendencies, conjoined with not having inherited or acquired the value-perceiving faculty, are toward extravagance and waste in governmental matters. What would have been saved to the people of the United States since the beginning of the civil war through wise methods of taxation is almost beyond conception. The loss to the Federal Government during the single year 1864, when revenue was most needed on account of the war, through a needless imperfection of the law imposing taxes on the single item of distilled spirits, was proved to have been in excess of $50,000,000.

In short, it is a most singular idiosyncrasy of the American people, and perhaps the people of all other countries, that they will defer or neglect the study of the most vital question which can concern a citizen. Probably not more than one citizen out of a hundred, even among those who pay taxes, can be induced, as a rule, either to talk about, think about, or study how much national Government costs him per annum, or how much his State or local government costs. And as long as this is the situation, and until the American citizen does become a student of taxation, it is difficult to see how the national and State governments can be wisely and justly managed.

Of the utter lack of comprehension of the results of what may be termed everyday experiences of taxation, coupled with a general indifference to the subject, which often characterizes American legislators, even such as are popularly regarded and spoken of as statesmen, the following incidents will abundantly illustrate: Pending a recent presidential election, a distinguished member of the Senate of the United States, and also of the American bar, assured a popular audience that the people of the single State of Illinois paid a larger amount in taxes to the Federal Government than were paid by all the people of the former Confederate States. Such a statement was obviously made on the assumption that because the State of Illinois annually manufactured a very large amount of distilled spirits, the burden of a very heavy tax on the same rested upon its people; when a very little thought would have shown that the manufacturers of the spirits incorporated the tax in the market price of their product, and that the payment of the same fell entirely upon the people who consumed them, who were not in the main the people of Illinois. If this was not the case, the manufacturers of Illinois paid and assumed a tax obligation of ninety cents a gallon for the privilege of making whiskey costing and worth an average of but thirteen cents per gal-

lon. The average annual consumption by the people of Illinois at the time, supposing that they actually paid the tax on their product of whiskey, must have also been at the rate of over six gallons per head for every man, woman, and child of its population.

When "an act to reduce taxation to provide revenue for the Government and for other purposes"—passed August 28, 1894—was under consideration by the Senate of the United States; and pending a proposition to increase the revenue by increasing an existing tax of about seven hundred per cent on the average prime cost of distilled spirits to a rate of near nine hundred per cent, a Senator of long experience, apparently utterly oblivious that the subject involved had years before been thoroughly considered by the United States Treasury Department and declared to be impracticable, submitted a motion, permitting the use of alcohol in the arts, or in any medicinal or other like compound, without the payment of any internal revenue tax. The motion in question, after very brief consideration, was accepted and incorporated in the statute and now forms a part of the fiscal obligations and laws of the United States. The result was that the Secretary of the Treasury reported, that in default of any appropriation to defray the expenses of the administration of the act and the repayment of taxes, and "after full consideration of the subject, and an unsuccessful attempt to frame regulations which would protect the Government and the manufacturers, the department was constrained to abandon the effort." It was also estimated that the expense to the Government of attempting to administer the act would probably be not less than one million dollars per annum; that the legitimate loss of revenue contingent on its enforcement would be about ten million dollars yearly, or "more than one half of the estimated increase of revenue" that it was expected to accrue from the increase of the tax, and that the loss of revenue from the opportunity for illicit and fraudulent practice, which the act would facilitate would be unquestionably very considerable—probably an equal amount. The inference from all of which is, that when a State sends a representative to the United States Senate who, through indifference or gross ignorance of the most common principles and domestic experiences of taxation prospectively, entails a loss to the Government of some twenty million dollars per annum, it pays a very great price for such a privilege.

During another comparatively recent fiscal debate in the United States Senate, a Senator, who is popularly and justly accredited with statesmanship, advocated certain proposed appropriations of the public money, which were opposed on the ground that they were in the nature of extravagances, by saying that they could not be grievous to the people "since they would not amount to more than *three* cents per day per capita." But three

cents per day assessed on sixty-five millions of people would amount to nearly eleven dollars per head per annum, or over seven million dollars for the entire country.

Finally, there has been one most serious and unfortunate mistake, which nearly all who have undertaken to discuss the principles and practice of taxation have been prone to make—a mistake, moreover, which more than all else is responsible for the opinion which has come so generally to prevail, that the subject of taxation, through lack of any fixed principles or axioms, does not as yet rise to the dignity of a science; and that its practice at the best can be but a sort of empiricism, to be varied in proportion to the strength which a Government possesses to enforce its enactments, or in proportion to the prejudices of the people who are to be called on for a contribution. The mistake consists in taking up the subject for investigation and discussion, if we may so express it, wrong end foremost; or in devoting time and effort to warring against abuses; or in attempting to show how certain forms of taxation commend themselves in respect to productiveness, freedom from personal inquisition, and economy in collection, and how others are to be avoided for contrary reasons; and in not attempting to inquire whether the whole subject was underlaid by any general laws in accordance with which the contributions which the State is compelled as a condition of its existence to exact of its citizens diffuse themselves; and which laws, being once determined, will constitute a certain and sure foundation on which practical administration can be based and conducted.

The fact that such laws exist and only await discovery may be predicated, as it were, from surface indications, in the form of a great variety of disconnected economic facts, with just as much of certainty as the miner who, picking up here and there in the beds of streams fragments of coal or ore which the elements have scattered, predicates that somewhere there must be a larger vein or deposit from which the fragments have been derived.

The aggregates of the sums required by the governments of the world for their support are annually increasing, but probably in no greater ratio than the increase in their wealth, or property rightfully subject to taxation; and in those states in which there is a marked and continued increase in the control of the forces of nature for production, the ratio of taxation to aggregate wealth undoubtedly tends to diminish.

That there are, however, some striking illustrations that seem to prove to the contrary, is not to be denied. Thus, we have a recent statement that the expenses of the city of Philadelphia in eight years have increased two hundred and thirty per cent, while the taxable valuation of property in the same time has increased only twenty-five per cent. In 1862 the aggregate taxation of the

city of Providence, R. I., was $379,000. In 1892 it was $2,333,000. In the former year the taxable real and personal estate was valued at $61,000,000, while for the year 1892 the valuation was $155,000,000. Thus the increase in the amount of taxes collected within the thirty years was five hundred and fifteen per cent, while in the amount of assessable property the gain was only one hundred and fifty-four per cent. The rate of tax increased during the same period from $6.50 per $1,000 to $15.

Among the leading nations of the world the comparative burden of exactions by Government is heaviest in Russia, Italy, and France. In Russia the present governmental exactions—under the name of taxes—from the agricultural peasant are reported to be about forty-five per cent of the value of his annual product or earnings. In Italy the State exaction is believed to absorb from one third to one half of the value of its agricultural product. The present aggregate of annual taxation in France is undoubtedly the greatest to which any country in modern times has been subjected; and including all taxes—national and local—is estimated as in excess of $1,400,000,000, or about one fourth of the annual income of its people. And yet it is claimed that the prosperity of the nation is increasing. There can, however, be no doubt that the financial strain caused by such great and continuous demands on the income of the French people is beginning to be severely felt; and in a recent budget discussion in the Senate of the republic, M. Loubet, chairman of its financial committee, insisted that taxation had reached its utmost endurable limit.*

As far back as 1879 the taxation imposed by Spain on her island of Cuba was reported to have made the latter the most heavily taxed country in the world; the rate on its free population being then estimated as equal to $34.50 per capita.

The cost of the Government of Great Britain for 1893–'94 defrayed by what are termed imperial taxes—mainly customs and inland revenue, and deducting all items of compensating revenue—as receipts from crown lands, etc.—was £75,427,000. The

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* In a recent article in the Économiste Français, M. Leroy-Beaulieu presents some facts which enable foreigners to form an opinion of the financial management of France under its present democratic form of government. There is at present, according to this well-recognized authority, an actual annual deficit of between three and four hundred million francs. The floating debt, "official or concealed," has taken enormous proportions, and is met by a variety of expedients, and mostly by secret loans (which are always costly), because the Government does not dare contract a large public loan, the only regular and least expensive means of extrication from financial embarrassments. Expenses are piling up and nobody takes any thought of repressing them. In short, according to M. Beaulieu, there is under the present Government, notwithstanding "constant and vain buzzing on the subject of democratic reforms, the adhesion of a mollusc to the wretchedest routine and a downright hatred of every kind of improvement."

total expenditures of the local authorities of the kingdom for 1893, defrayed from rates on the annual value of houses, or lands occupied, from gas and water rents, tolls, dues, loans, etc., and less the grant of subsidies from the Imperial Government, was about £56,000,000, making an aggregate of £131,400,000—or $657,000,000.

For the year 1890 the aggregate receipts of the Federal and State governments of the United States, mainly from taxes, as reported by the census for that year, were $1,040,473,013, apportioned as follows: Federal taxation, $461,154,000; State or local taxation, $578,328,000. Deducting the cost of postal service repaid by postal charges, and the receipts from the sale of public lands, the aggregate expenditures of the Federal Government would have been about $390,000,000.

Of these large sums it is safe to say, more especially of the latter national summary, that very small proportion, not even as much as a single dollar, has been raised under a statute framed and enacted solely from recognition of and conformity with any correct economic principles; and that in most, if not all, tax legislation, ideas not warranted by thought and experience, and based on expediency or political considerations, have always predominated. Illustrations of the truth of this assertion are abundant, but for the present one most pertinent, drawn from recent experience, must suffice. In August, 1891, the Farmers' Alliance of the State of Maryland held a convention in Baltimore, for the purpose of advocating a complete revision of the tax laws of their State, the imperfection, injustice, and practical futility of which were not questioned. And after general debate the following resolutions were unanimously adopted, not one of which is economically true; not one of which in the light of experience can be successfully enforced by other than a despotic government; and every one of which, if enforced, would prove prejudicial to the interests of the community which sanctions and enacts them:

Resolved, that the burden of all taxation ought to be imposed equally and impartially on all property, of whatsoever kind, both personal and real, without distinction and discrimination; that every exemption from taxation is equivalent to direct appropriation for the benefit of the owner of exempt property, and an increased levy on the property of those who pay taxes; that no tax law which provides for the exemption of any property of any kind can be either expedient or just; that no law, no contract, no device which by any means directly or indirectly imposes the payment of any part of any tax upon any man not the *bona fide* owner of that property ought to be tolerated; that debts secured by mortgages at legal interest are among the best and most productive forms of property, and should be taxed when the mortgages are recorded.*

* In the following chapters the absurdity of the above resolutions will be specifically demonstrated.

A recent English writer has claimed that the experience in reference to taxation of the forty-five anomalous sovereignties which now make up the United States [none subordinate to a national Government except to a limited extent and in respect to particular questions], has thrown a great light upon the temper of democracies. "Half a century ago every thinker predicted that the one grand evil of democracy would be meanness; that it would display an 'ignorant impatience of taxation,' and that it would refuse supplies necessary to the dignity, or at least to the visible greatness, of the state." That prediction has, however, proved itself, not only by the experience of the United States, but also of the leading countries in Europe, to be the exact contrary of the facts. "The lower the suffrage, the higher the budget mounts. Democracy loves spending, is devoted to dignity, and, provided they are indirect, or fall heaviest on the rich, will pay any amount of taxes. The English democracy with household suffrage, though it has reduced its debt, has increased its budget, increased rates all over the country, and would not be frightened to-morrow if a great socialistic experiment were to cost it a hundred millions. It hardly shudders when it is asked to support in comfort, at a cost of about £17,000,000 ($85,000,000), its whole aged poor. The French democracy has nearly doubled its taxation and raised its debt more than a third, apart from the tribute paid to Germany. The German democracy, with enlarged suffrage, a poor soil, and nearly universal poverty, is always granting new demands, whether for soldiers, ships, colonies, or centralized officials."

But it is in the United States, with universal suffrage and the richest of estates, that the extravagance of government expenditures, sustained by taxation, rises to a point which fiscal experts, like Alexander Hamilton, Robert J. Walker, and Albert Gallatin in the United States, and Sir Robert Peel or Ricardo in England, could not have been persuaded to believe possible. Either of them would have declared an American pension list amounting to $155,000,000 (£31,000,000) a year too absurd for credence, and would have criticised the prophet who made the prediction for his poverty of invention.

That the interests benefited by national extravagance will, under free suffrage, always constitute a formidable obstacle to judicious tax reform, especially if such reform contemplates national economizing, can not well be doubted; and also that this opposition will be re-enforced to some extent by a popular feeling that something of color and dignity will go out of national life by any marked curtailment of the expenditures of the State. On the other hand, the political supremacy of the United States confessedly yet resides in its agricultural classes, who more than any

other are characterized by a spirit of thrift and a desire for equitable and low taxes.

Such, then, is the situation which confronts any one who proposes to discuss broadly the great subject of taxation with a view of effecting reforms in the existing system. It exacts, on the part of him that is to attempt it with any prospect of success, a familiarity with theory, not merely gained from the study of books, but theory based on extensive practical administration. It requires, on the part of both the teacher and the taught, what Herbert Spencer has declared to be the conditions of success in all departments of scientific research, namely, "an honest receptivity and willingness to abandon all preconceived notions, however cherished, if they be found to contradict the truth."

PRIMIGENIAL SKELETONS, THE FLOOD, AND THE GLACIAL PERIOD.

By H. P. FITZGERALD MARRIOTT.

PART I. THE PALÆOLITHIC SKELETONS OF MENTONE.

IN the rocks near Mentone that go by the name of *Les Rochers Rouges* * there was discovered, on the 12th of January, 1894, another human skeleton. It is that of a man about six feet two inches in height, but, owing to the head having been crushed, accurate measurement is difficult. M. Adolphe Mégret,† however, has calculated the height of the living man to have been 1·984 metre. This he does by multiplying the length of the *phalangine* ‡ of the medial finger, 0·031 metre, by 64, a method that in every case proves successful. The first account of this find, in the local Anglo-American, mentioned two skeletons, and in spite of it being now affirmed that only one was discovered, we rather suspect that there was truth in the first statement, especially as the leg bones of another are admitted to have been found beside it; and all the more, knowing as we do how the skeleton of 1872 was accompanied by two others, the existence of which was kept a secret, as they were too imperfect for the scientific discoverer to describe conscientiously at the time. This skeleton of 1894, as we must hereafter call it, lay on its back, inclining to the left side, the body slightly bent, the legs stretched and crossed below the knee, the right arm bent and with the hand lying open over the left breast,

* In dialect their name is *Baoussé-Roussé*, the Italian for which is *Balze Rosse*.

† Étude de Mensurations sur l'Homme préhistorique, Nice, 1894.

‡ *La phalangine* is probably the smallest and last of the phalanges of the medius.

while the left hand was supporting the side of the head. The teeth are large and strong, but much used; the front teeth are nearly as thick as ordinary molars. Near the right hand was a crystal of quartz, similar to those found on the rocks around to this day, but pointed at one end, and about two inches long and an inch and a half thick; some suppose this to be the top of the handle of a knife. The head was ornamented with chaplets of deer teeth and shells. By the remains and on the bones is seen the same deposit of red ochre that was noticed on all the other skeletons. Several slabs of stone were found, which seemed to have formed part of a dolmen. The skeleton, however, was not resting in a palæolithic stratum, though it is considered that these remains are pre-neolithic. A few metres below it, however, in a stratum that is decidedly palæolithic, were found several huge mammoth bones—the hip-joint head of the thigh bone (femur) and the socket of the pelvis: *beneath* these was found the remains of a fire—a line of black in the stratum—and a large flint instrument, thus proving that man was contemporary with the mammoth.

The length, or depth, of this cave was once at least forty-five metres; and its mouth appeared smaller when it opened nearer the sea, before quarrying destroyed it, and, in particular, removed nearly the whole of its eastern side. At present its depth is about twenty metres, though the end is but a mere crack. It now appears as a huge fissure that rends the face of the lower end of the Rochers Rouges for fifteen metres to nearly the height of the cliff; but from the sloping and irregular level of its own earth floor, which rises several yards above that of the base of the cliff, it is only thirty or forty feet high, and narrows at the top to a mere crack. In width it is about four metres, diminishing inward. Within the dark brown mold filling the lowest levels of this cave, which for facility of reference is called No. 5, were found also the skeletons of 1884 and 1892.

The rocks in which these human remains, bones of animals, and flint instruments have from time to time been discovered are situated at the east end of Mentone, and extend toward the sea, which washes their rough rocky beach; they rise on the other side of the little stream of the St. Louis ravine that divides France from Italy, and are therefore on Italian soil. Round their base runs the narrow old Roman road, which crosses a little bridge of the same date, immediately after rounding the corner. These ruddy colored cliffs are composed of the secondary cretaceous limestone, and contain many crevices and small caverns, in which, mixed with the softer earth covering the floor to many yards in depth, have been found from time to time mammalian bones, with shells and crustacea, imbedded in places in hard sand and calcareous

matter, mixed with flint instruments. Thus they were known in 1848, yet even as early as the last century De Saussure had drawn the attention of the scientific world to their existence. But in 1858 they were first actually described by M. François Forel, a Swiss. M. Rivière commenced excavations in 1869; it was not, however, till 1872, while making the cutting for the railway, that the first human skeletons became unearthed by him on March 26th, six metres and a half below the level of the older excavations, in cave No. 4. Beside the one on which M. Rivière wrote his monograph in 1873, two others * were discovered lying near it about the same time, but so badly were they broken that he made mention of only that one, which is now in the Natural History Museum of Paris. On its head were found some shells forming a circlet, as also some carved reindeer teeth in the same position, while beneath the head was found a curved flint blade. It was supposed to have been the skeleton of an Ethiopian, at first, but there were differences that marked a race that has now passed away, or become somewhat altered: the orbital cavities were larger, and its height, though not great, was abnormal. We pass over this skeleton,† and all that M. Rivière has already written about it, and all the names ‡ that he has given to the flint and

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* In a paper of February, 1892, by M. Binet-Heutsch, entitled Nouvelles Découvertes aux Grottes de Menton, we find mention of a skeleton that was found in the same cave by M. Rivière in the following year (1873), far less well preserved than the first. It was of enormous size, and was more than two metres in height; the skull was damaged during the excavation. Possibly this may be one of the skeletons that we have mentioned, on the excellent authority of one who was present with M. Rivière at the time, as having been discovered with the 1872 skeleton. Mention, however, is made by M. Rivière of three skeletons, that he found, in a brochure entitled Découverte d'un second Squelette humain de l'Époque Paléolithique dans les Cavernes de Baoussé-Roussé, Nice, 1873. With the measurements given of these last three skeletons by M. Rivière, M. Adolphe Mégret (by his method of multiplying the length of the phalangine of the medial finger by sixty-four), in his Étude de Mensurations sur l'Homme préhistorique, calculates their living heights to have been respectively 1·984, 1·920, and 2·048 metre.

† An amusing Box and Cox episode recalls to our mind the name of Mr. Moggeridge, a gentleman who many years ago lived at Mentone, and who published an excellent outline panorama of all the mountains as seen from the Borrigo Valley bridge, and who had scientifically studied the exact maximum and minimum temperature at the top of each summit. This gentleman, being equally persuaded that he would find human bones beneath the other remains of extinct animals and flint instruments, used to work at the cave during hours when it was deserted, leaving the soil somewhat disturbed, to the bewilderment of M. Rivière on his return the next day. It fell, however, to the lot of the Frenchman to remove the last layers of earth, and, therefore, to have gained the sole honor of being the discoverer.

‡ Among other names, M. Rivière, in his monograph published in 1873, Découverte d'un Squelette Humain de l'Epoque Paléolithique dans les Cavernes des Baoussé-Roussé dites Grottes de Menton, gave that of "*bâton de commandement*" to a small bone, *un métacarpien principal gauche, appartenant à l'Equus cavallus* (a chief left metacarpal of a horse), which is 0·21 metre in length, or about eight inches. It is pierced by a hole, and he re-

bone instruments that were found beside it, and we come to the skeletons discovered in cave No. 5 by M. Bonfils, curator of the Mentone Museum, in February of 1884. Again three were found together. Owing to the stupidity and jealousy of the actual owner of the land, an Italian peasant of the name of Abbo, they were much broken; but neither of these skulls, which M. Bonfils has shown to us, seems to be quite of the same formation as those of 1892, though the peculiar, somewhat quadrangular shape of

PHOTOGRAPH OF THE PALÆOLITHIC SKELETON DISCOVERED IN THE FIFTH CAVE IN THE ROCHERS ROUGES, NEAR MENTONE, ON JANUARY 12, 1894. Reproduced by the kind permission of M. Bertrand, Mentone.

the orbital cavities, turning up at the outer corners, is very similar. Prof. Boyd Dawkins believed these 1884 skeletons to be of "doubtful antiquity." They, however, appear more ancient than those found in 1872; and the male skeleton was of gigantic size, being six feet nine and a half inches in height, from top of head to heel, according to M. Bonfils. The latter also discovered with

marks "devait être porte suspendu au cou comme insigne. Il ne porte aucun dessin, ni gravure, ni entaille" ("was probably worn suspended from the neck as an *insignium*. It bears no drawing, or engraving, or carving"). We may here add that if what he here describes is in any way like what we have referred to under the skeleton of 1892, it is probably a roughly formed totem for veneration.

this last specimen several flint blades, one on each shoulder and one resting on the top of the head. It was 8·40 metres below the original floor.

Of the three skeletons discovered in February, 1892, Mr. Vaughan Jennings gave a description in an article to which we will refer later on. They also were found in the fifth cave, but a very little further within its depths than those of 1884, and were first noticed by workmen who were blasting and hewing the face of the cliff for stone. During this work they gradually destroyed the sides of the high cleft or cave, and in removing the hard earth that filled its floor to some eight or ten feet in depth, at the distance of about twenty-five metres from its original entrance, they came upon a skull which, unfortunately, was broken by the blow from a man's pickaxe, or, as some say, by the energetic digging of one of Abbo's young sons with the iron instrument used for sinking holes for blasting. From that moment, but not with sufficient care, the skeletons, lying side by side, were unearthed and rapidly robbed of the flints and ornaments found about them, with the result that none can be certain in what position Abbo found them. At first only two were entirely visible—those of a man and a woman—but soon a third, that of a youth, lying between the two, came to light. They lay seven metres and a half below the original floor. All are of great size; the skulls being broken and the skeletons half in the earth, exact measurement of the height was very difficult at the time; but both then and since the skulls have been pieced together we have managed to take some sort of measurement, showing the biggest skeleton, from the crown of the skull to the heel, to be six feet ten inches and a half,* and the other two about six feet six inches and a half. If, then, we allow for the shrinking of the tendons and for the flesh on the heels and head, the man must have stood about seven feet four inches, and the others, to whom the remaining skeletons belonged, about seven feet and half an inch at most. No child was found, as was erroneously stated by a newspaper. The skulls are of unusual size and thickness, the frontal bone being at least a quarter of an inch thick, and the parietal and occipital bones fully three quarters of an inch. The occiput in one of them is enormous, and is very much larger and out of proportion to the rest of the cranium, being expanded lengthwise, while in another it is the parietal bones which exhibit excessive extension. The orbital cavities are unusually large and curiously curved up at the outer corners. The bones, too, are of great thickness; they are, however, most friable; to the slightest touch many of them will crumble, and all

* M. Adolphe Mégret, by his usual calculation, makes the height of the living man to have been 2·144 metres, or about seven feet and half an inch.

of them are covered with a red sort of rust, while they lie in a sepia-colored earth softer than that which is immediately above and around them in the cave. M. Bonfils explains this rusty color by the fact that lumps of red ocher have been found near the skeletons, probably having been obtained from some rocks that exist not far off; with this the bodies most probably had been covered, and the flesh having disappeared, the ocher had settled and remained on the bones. It is said that around the head of the man was a circlet of carved reindeer teeth and a chaplet of shells, and around the necks of all were found necklaces, of course long since fallen to pieces, formed from the backbones of fish; these latter have been strung together on wire. But so many people claim to have seen the skeletons first and dispute each other's assertions with regard to these relics found with them that we only refer to them for what they are worth: certain it is that circlets of carved reindeer teeth and other objects have been found in these caves; all that has been found we have ourself seen, but, unfortunately, no authoritative person was able to reach the caves in time to ascertain in exactly what positions these chaplets, knives, and other objects were found by the peasant Abbo and his wife, to whose house, not far from the caves, the articles were at once transported, to be placed with many others which have from time to time been discovered. These bones and other objects are here and there tinged with the same ocher rust with which the skeletons themselves are covered. The outermost skeleton, that of the man, was lying on its back, the knees slightly bent toward its left, its arms stretched out by its side. In the left hand was found a flint blade exactly nine inches long, held loosely, which proves that once there was a handle of some perishable material. The woman and the youth had been buried lying on their left sides, the legs bent slightly at the knee; the former held in her left hand, raised beside her face, a smooth, wide, and hollow-curved blade of flint that lay under the head as if it had been placed there for it to rest on, while in the right hands of both these smaller skeletons were said to have been found flint knives, as in that of the bigger one. Their right arms were bent so that the hand reached the shoulder. The third, buried between the man and woman, and whose skull is missing, we have taken to be that of a tall youth. From the appearance of these skeletons they seem to have been buried rather than to have been overcome by some sudden catastrophe, as has sometimes been supposed of that of 1872, which was very much bent up and leaning on its left side. Around them, above and below, were the bones of many extinct species of mammalia—huge teeth, teeth of reindeer and of the *Bos primigenius* and the horse, together with many small flint instruments; but these would merely seem to indicate that

they had been buried in the cave in which, during their lifetime, they had lived and consumed these animals whose remains we find.

M. Adolphe Mégret suggests that, in the position in which all the skeletons that have as yet been discovered were found to have been buried, we are "in the presence of a funeral and religious rite that was perpetuated." Here we would further draw attention to the little bone objects of various dimensions, but always of the same shape, that have each time been found with the

PHOTOGRAPH OF THE PALÆOLITHIC SKELETONS DISCOVERED IN THE FIFTH CAVE IN THE ROCHERS ROUGES, NEAR MENTONE, IN FEBRUARY, 1892. Reproduced by the kind permission of M. Bertrand, Mentone.

ornaments that are supposed to have been around the heads or necks; we refer to the pieces of bone that measure from about one inch and a half to three inches in length, cut in the center so as to form two ovals joined together; they are slightly ribbed longitudinally; these were supposed to have united the ends of the necklaces of deer's teeth or shells and thus been suspended in a prominent position; they probably were roughly cut "totems" or objects of veneration of their "religious" instinct. Even the same shaped "totems" have been found elsewhere. For further and fuller explanation of a meaning that we can not express here,

see a note in our Facts about Pompeii, published by Messrs. Hazell, Watson & Viney, London.

Mr. A. Vaughan Jennings, as we have said, in 1892 had an article in the June number of Natural Science concerning The Cave Men of Mentone, which was so peculiarly inaccurate in its facts as to merit a few lines of criticism. First of all he refers to M. Rivière's skeleton of 1872 as if discovered in 1873. It was M. Rivière's monograph that appeared in 1873. Knowing the place, as we have all our life, we can say that he is correct when he affirms that "the east side of the cavern No. 4 * has been a good deal cut back by quarrying," although he omits to mention that both sides of the cavern—indeed, the whole face of the cliff—some twenty years ago came to within a couple of yards of the rocks that break the force of the sea. Mr. Jennings, from his statement, shows that he did not see the remains till the 15th of March, and that by that date they were considerably modified, the skull and arms having been removed. We saw the skeletons on March 18th, and according to notes we made at the time the arms were still there; however, we had the opportunity of seeing them on the 23d of February in a very complete state. We also saw the left arm of the third skeleton, that of the woman, bent up, which Mr. Vaughan Jennings particularly says was not the case. In a footnote on M. Rivière's measurements and those mentioned by the papers, Mr. Vaughan Jennings regrets that "the exact measure will probably never be known, as the neck and shoulder region is now destroyed." We are happy to have been able to supply this necessary information, from measurements that we took at the time on the spot, before the skeletons were removed from the earth in which they were imbedded. Later on Mr. Hanbury, of Mortola, very generously bought the skeletons from Abbo and placed them in the latter's cottage with the other remains; this has saved them from further destruction. Mr. Jennings places the 1892 skeletons between the palæolithic and neolithic periods of man, and very rightly deprecates the habit of speaking of these periods with sharp distinctions; thus it is possible that an intermediate race existed, while it is only natural to understand that the formation of neolithic man was merely a series of progressions from earlier forms. On the other hand, the period of time between the existence of palæolithic and neolithic man may not have been so great as has been supposed.

PART II. MAN, THE FLOOD, AND THE GLACIAL PERIOD.

Flint instruments, the product of man, for a long time have been often found in many places. It is merely necessary here to

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* M. Rivière's No. 5.

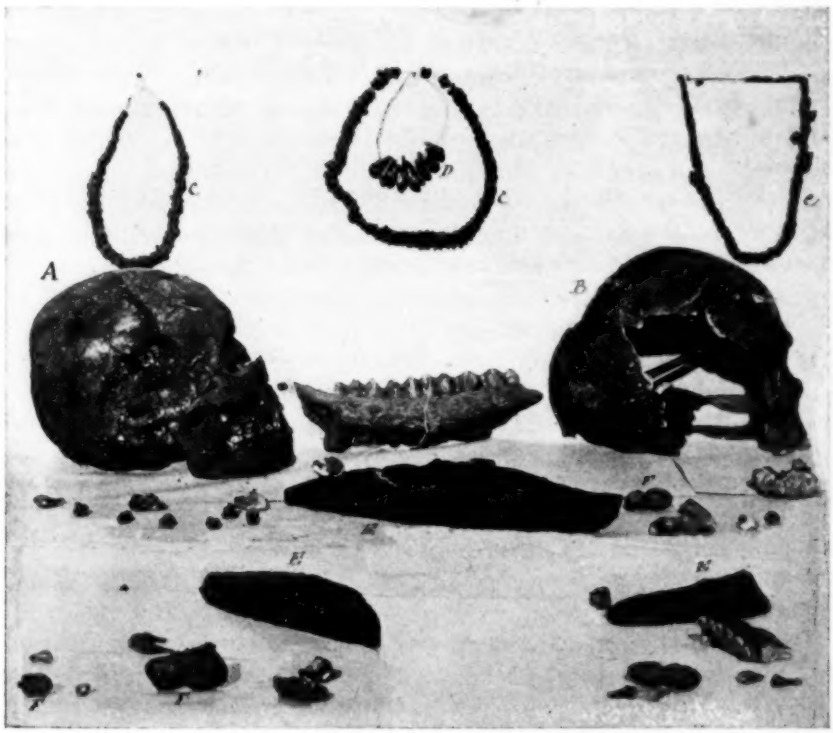
mention a few instances. In 1715 a flint knife, now in the British Museum, was found imbedded in gravel with the tooth of an extinct species of elephant, near Gray's Inn Lane, London, thus marking the extreme antiquity of flint instruments. In 1797 flint hatchets were found in Suffolk, and in 1847 flint instruments at Abbeville. In 1858 Sir Charles Lyell found others in the valley of Somme in Picardy. Flint instruments have been found in caves all over the earth, mixed with bones of animals that lived before, during, and after the Glacial period. They can be more or less classified according to their form and finish.* We believe that in all instances flint instruments have been found with what are supposed to be the earliest skeletons of mankind; moreover, the oldest type of flint instrument has been found with the skeleton of man.†

The difficulty now is to assign a period to the earliest type of flint instrument. If this can be done, the period in which man first appeared on the earth can be more precisely ascertained, and this in two ways—either by finding these flint instruments beneath certain strata which can be assigned to certain periods by geologists, or by finding them with the bones of certain animals the period of whose extinction is also approximately known. This only is certain: that the bones of extinct species of animals, extinct yet still represented by later races, have been found in these and other caverns with those of man and with flint instruments. These bones are those of mammalia of the Miocene, Pliocene, and Pleistocene periods. Secondly, the caverns in which these human bones have often been found have, we believe, been always in the Secondary and Lower Cretaceous rocks, though this does not, of course, show that man was in existence immediately after the formation of these rocks, but merely that they were the most accessible and convenient for him in which to live or be buried, for many of the skeletons that have been discovered seem to have been carefully buried by others. The alluvial deposits, formed by the action of water, which actually contain man's remains, belong to a more modern era than the newest stage of the Tertiary epoch and are within the Post-tertiary series, in the Pleistocene, Glacial, or Bowlderdrift period, as it is variously

* M. Bonfils, curator of the Mentone Museum, in order to prove how rapidly these flint knives, hatchets, spearheads, daggers, fishing weights, etc., could be made, has himself made many with the aid of only stones with which to commence, and later on with the help of the instruments thus formed. And thus he has found that they only took from five hours to nine days to make, according to the quality of the flint or agate and the form of the instrument.

† Previous to flint, man must have used wood, breaking boughs from off the trees and making them into the form of stout staves and clubs, and later into that of wooden spears, bows, and arrows, of which perishable materials naturally no traces can be found.

called. But then we must remember that this may not have been the original soil in which they first lay, for the very reason that it is alluvial and could have been formed afterward. In 1852 human bones were found in a cave at Aurignac, near the foot of the Pyrenees. In caves in the valley of the Meuse, near Liège, three human skeletons with flint knives and a mammoth's tooth were found. In 1858 human bones were found in Brixham cave



PHOTOGRAPH OF SOME OF THE PALÆOLITHIC REMAINS DISCOVERED IN THE CAVES NEAR MENTONE, IN FEBRUARY, 1892. A, B, skulls of two of the three skeletons; C, chains formed of fish bones strung together by the holes with which they were found to have been pierced; D, carved reindeer teeth strung together by the holes with which they were found to have been pierced; E, flint knives, etc.; F, carved bones, shaped as if to be tied round the middle by a string, and possibly worn round the neck or wrist as an ornament or "totem." (See note, page 12, Facts about Pompeii; Hazell, Watson & Viney, London.) Reproduced by the kind permission of M. Bertrand, Mentone.

near Torquay. In 1863 a human tooth and jawbone with flint instruments and the bones of extinct animals were found in a gravel pit at Montin-Guignon. In North America human bones have been found in the caverns of Kentucky, and in South America in caverns in Brazil. In the Dordogne caves in central France were found perforated teeth, vertebræ, and shells of Cypræa, and still more important the bones of mammoth and

reindeer on which were etched the figures of mastodons, deer, and horses. Caves in Saxony, Gibraltar, Austria, and many other places have been discovered containing human bones. The human skeletons discovered in a modern limestone formation at Guadaloupe, in the Windward Islands, are possibly of a later period and are not even fossilized, though imbedded in compact stone. In August, 1894, Herr Mascha, director of the Grammar School at Predmost in Bohemia, who has for many years made discoveries in that neighborhood and has found hundreds of mammoth skeletons, has unearthed a family of six people—a man of enormous size and a woman and her children—near to the remains of mammoths; this is said to be the furthest northeast that primeval man has been discovered with the bones of antediluvian animals. It is a pity that more exact information upon certain interesting points has not come to hand. It is equally a pity that all such treasures of the ancestry of our race should not be preserved and indeed systematically sought for by professional scientists and archæologists, for we know how those at Mentone have been ruined and altered and their ornaments removed by the peasant Abbo and his workmen before competent judges have had any chance of observing the several different points of interest that seem to require even more than the knowledge of the anatomist and osteologist. These remains at Predmost and the men whose bones have been discovered at Mentone must have been coëval with the animals of either the Miocene, Pliocene, or Glacial periods. But as late as the Glacial period the bones have been discovered of mammoth and of extinct species of lions, bears, rhinoceros, hyenas, reindeer, Irish elk, and of the *Bos primigenius*, animals that had also existed in the two earlier periods, and with whose bones flint instruments have been in different places discovered in fluviatile gravels and in caves. This, however, only proves that man lived either during or just previous to the Glacial period, the latest at which these animals existed. Till, however, the bones of man or his flint instruments can be found with the bones of some animal that became extinct before the Glacial period, we can not place him at any earlier date.

If, however, man existed before or during the Glacial period, it is strange that there should be no tradition of such a change taking place on the earth's surface. It may be that the alteration in temperature was so gradual, and extended over such a great length of time, that the generations of men who succeeded each other were unaware of it; perhaps, too, almost imperceptibly to themselves, the then existing races of men moved gradually to warmer regions, keeping pace with the advance of cold, which we must, in reasoning thus, suppose to have been so gradual that at any rate nomadic races would not have noticed it by their tradi-

tions. But such a change in one portion of the earth would not be likely to take place without a coincident change everywhere else. While ice lay over a great portion of the earth, the rest of its surface may have possessed a temperate or almost semitropical climate, of peculiarly equable character the whole year round. The race of men born in such a zone would probably be hardy and strong, and this is precisely what we suppose our first ancestors to have been. But, though in what appear such favored conditions, they have left to us, in nearly all the races that have sprung from them over the whole world, a tradition of a great catastrophe—a flood. The chiefs of the then world, it seems, were saved, and, whether in one ark, or in several strangely and wonderfully built vessels, were preserved to again spread the human race. But how came this flood, and when? And why should immense quantities of rain descend, and why should the seas rise in every direction? If we refer to the probable cause of the Glacial period, we shall also see the origin of the flood. It is, we believe, an accepted theory that the mountain ranges of the globe were formed by the shrinking of the earth's crust. This was caused by the diminishing lava or molten earth within having contracted at length to such an extent as to have been often removed during the globe's rotation on its axis far away from the still self-supporting crust, till a stage was at length reached when the outer crust became so cold that ice gradually formed over all those parts that were furthest from the molten liquid. At the two poles—that is, furthest from the greatest sunshine, as also from the lava (since the latter would be naturally drawn round with the velocity of the equator, and therefore would be furthest from the poles and nearest to the equator)—there was the greatest abundance of ice. After many centuries of this there came a time when the crust could no longer support itself; the strain of the internal lava beating loosely within was too great at times; great convulsions shook the earth's surface, the crust breaking in long lines, and forcing up huge mountain ridges covered with gigantic blocks of ice that rose thousands of feet high. The crust, diminished in extent, again touched the molten lava, the ice melted, volcanoes arose, steam escaped from the cracks, the whole range of the Andes poured forth clouds of steam, the earth again became warm. But what then happened? The water that was formed by the melting ice, that had not risen in steam to the clouds, spread at once over the lessened area of the earth's surface; the seas rose in every direction and chilled the air; and thus the earth's outermost surface also once more cooling somewhat, the vapor or clouds dispersed around descended again in torrents to add to the great sea already spreading between the newly raised and the ancient mountain ranges of the earth. This, then, is the

connection between the Glacial period and the flood, and the probable reason why no tradition has descended to us of the former; first, because man was born during its epoch and was formed by it and accustomed to it, and living in the one temperate zone on the equator saw nothing strange in his surroundings, and, secondly, because the only change that man saw was the sudden accumulation of waters descending from the earthquake-riven and colder portions of his then unexplored globe.

Thus, man's remains have been found with those of the mammoth—a mammal of the warm, subtropical Pliocene period, that lived on into the cold Pleistocene epoch. Probably his origin was previous to that of man; but man may not have appeared until the end of the Pliocene period and the commencement of the cold, which, in all likelihood, gradually and surely came on, as the interior of the globe shrank farther and farther away from contact with the easily chilled outer crust, which it left to fields of ice bordering a narrow temperate zone; the ice reaching from the north pole as far south possibly as 50° north of the equator, and from the south pole as far north as 40° south of the equator; thus the present temperate zones became arctic, and the tropical zone became almost unvaryingly temperate. Man probably in his first ages had spread far and wide north and south of the equator, but not so far as at present we find ourselves; he had been gradually driven back by the advancing cold, yet so slowly that the change did not make itself noticeable to him, and as his civilization advanced to the time when he began to build and to establish great cities he found himself settled near the equator, even further south than ancient Thebes, and probably where the great deserts of Arabia, Nubia, and those of the Sahara stretch their vast plains of sands, and perchance now cover works even older than the stepped pyramid of Ata. However long, therefore, these periods of change may have been, it seems very probable that man first appeared in a fresh, temperate climate, the only proof of which is that he has several times been found with the remains of the mammoth, an animal that outlived the primal warm periods. Probably no preglacial period existed for man. As for the length of time that must have elapsed between the first appearance of vegetation upon the earth until the time that the climax of the Glacial period arrived, when the flood took place, ten thousand years need not be too much. Midst the surroundings of that Glacial period, however, man's remains have been found, but not in those of the preglacial ages that lead back to the ichthyosaurus, plesiosaurus, and other monsters of the deep, or of the age of gigantic flora, huge pine trees, and enormous ferns.

If the flood, then, as some have calculated, was only five or six thousand years ago, then the coldest period of the Glacial age can

not have been very far removed, and not much further off than five or six thousand years from the present date; and those skeletons found near Mentone may be those of men who lived eight or nine thousand years ago, before the coldest epoch had gradually driven them further south, near the completion of the evolution of the race, and its consolidation into the perfect form of man, whose intelligence lives and breathes as much as does his more visible and wonderfully formed body.

RECENT TENDENCIES IN THE EDUCATION OF WOMEN.

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THE first women who asked admission to colleges which offered a higher education to men were those whose strong individuality and distinctive intellectual bent demanded some other outlet than housekeeping for their energies. They wished to teach in the higher schools, or to enter the professions of literature, law, or medicine. That competition with men in these lines required better training than was afforded by the "female seminary" was obvious, and they naturally inferred that it was only to be had by means of the same curriculum as that which men pursued. These first women, therefore, applied themselves to mathematics, Greek, and Latin, and found in them satisfaction for hungry minds, if not a perfect equipment for their business in life. Although many of them afterward married, their strong intellectuality is clearly shown by the mark which they have left on their generation in some lines of professional labor.

At that time women were not prepared to question the methods of education; in such matters they were accustomed to be led by men, and what seemed good to men seemed doubly good to those to whom it was newly opened. Indeed, before the middle of this century it had not occurred to many minds that anything else than the classical curriculum could be the basis of a truly high education. What wonder, then, that women should eagerly seek that which men valued most?

When it had once been granted by even a small number of intelligent people that it might be desirable for *some* women to seek a higher education, the door was practically open to any ambitious girl who had the will-power to overcome prejudice at home and the pluck to endure the opposition and scorn of men at college. Coeducation was the outcome of this tendency to demand for women precisely the same kind of education as that

which was offered to men. It is a significant fact that the early objections to it were primarily women's supposed physical inability and the danger to womanly character. The traditional curriculum was as well adapted to the needs of women as to the needs of men in nonprofessional occupations. It was rightly felt that there is a virtue in culture, irrespective of the aims of the individual.

By the Morrill Land Grant of 1862 coeducation was assured, potentially at least, in one institution in every State. The other provisions of the act, compelling the teaching of agriculture and the mechanic arts, also indicated the rise of a new and broader idea in education. The colleges thus founded were not intended primarily for rich men's children, but for the sons and daughters of the great middle class. Coeducation seems to have been a concession to the American sense of fairness. If the farmer's boy should have a school, then the farmer's girl must have a school too; it was obviously cheaper to educate them together, while social tradition, less developed among the farming classes and in the States west of New England, offered no obstacle to this purpose. While, therefore in New England coeducation was still mentioned with horror as an impropriety,* in the more crude and democratic West it was having a natural and wholesome growth.

The logical consequences of coeducation in these institutions were evidently not anticipated. The boy who went to the State college took lectures in scientific agriculture or mechanical engineering, with so many hours a day on the farm or in the shop, under a trained instructor; the girl who went to college took whatever was considered strictly ornamental in the course—French, literature, ancient history, rhetoric, with a certain number of hours per day of domestic work. But the hours of sweeping, bed-making, and dish-washing were illuminated by no application of scientific principles from the mind of a trained instructor. In fact, nobody knew very well what she was there for; it seemed only fair that she should "have a chance too," but a chance for what? Why, to marry, of course! But nobody ever said that aloud, and nobody thought of adapting her training to her probable and desirable business in life.

The West had solved the problem of woman's education by offering her the same curriculum under essentially the same conditions of life and discipline as those of men. The disasters to coeducation which had been prophesied had not occurred. Girls

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* Young men and young women have been taught together in the Maine Wesleyan Seminary, Kent's Hill, Maine, one of the best known classical and preparatory schools in New England, since at least 1828, and in the seminary at Cazenovia, N. Y., since 1830.—EDITOR *Popular Science Monthly.*

showed no physical or mental inability to endure the strain of college life, and apparently lost none of the precious bloom of true womanliness. But no sooner had the system become thoroughly established than a whole world of new social problems was discovered in connection with it. The primeval attraction of men and women for each other was not obliterated by the higher education. Conventionality stood aghast at the primitive and unrefined social life sometimes found within college walls. The social tone of these new colleges could not be much higher than that of the rural communities from which it came. It was not to be expected that students from progressive but uncultured communities should at once be transformed into dignified, self-restrained, conventionally proper young men and women.

Eastern scholars and teachers who went West to fill chairs in these colleges were shocked at the crudity which they met; in their eyes and in the eyes of the cultured New Englander all improprieties, unconventionalities, and crudities were the offspring of the vicious principle, coeducation. In New England, consequently, the pressure of social conservatism compelled a less radical solution of the impending problem of woman's education.

Following the type of Vassar, Wellesley, and Smith were founded still with the curriculum based on the old classical model of Harvard and Yale, but with living conditions and social restraints especially intended to preserve and develop womanliness. A liberal allowance of the classics, a little harmless inorganic science, some music or art by way of sweetening, and domestic labor as a reminder of housewifely occupations, constituted the regimen of the typical woman's college. No inducements or opportunities were offered for young women to enter any professions except literature and teaching. Curiously enough, few women could be found prepared to fill the professorships except those who had been coeducated at Oberlin, Michigan, and Cornell, and to them was set the task of preserving femininity by a harmlessly miscellaneous culture.

Meanwhile the great tide of scientific education had risen; the evolutionary theory had been proposed, attacked, accepted by the greater scientists. New fields were thus opened to men, which women as yet could not enter. That which they had supposed would insure to them the highest intellectual life no longer sufficed. In the larger coeducational colleges, laboratories and elaborate scientific equipments were rapidly acquired. Women, more conservative and true to the traditions of higher education, continued to choose classical courses long after science had become the most prominent feature of the younger institutions. Slowly the women's colleges were compelled to add zoölogy and physiology, laboratories and apparatus to their meager courses in science.

In 1886 two thirds of the senior class at Wellesley graduated from the classical course; in 1890 more than one half took the degree of Bachelor of Science.

Competition with coeducational colleges made it evident that the women's colleges were offering almost no facilities for specialization and graduate study. To meet this deficiency, and yet to preserve the distinctive ideals of separate education, a new combination was devised. Bryn Mawr proposed to offer opportunities for advanced study similar to those afforded at Johns Hopkins and Cornell, but under social conditions and restraints such as characterized the women's colleges, thus securing womanliness at no cost of intellectual development. Harvard Annex offered approximately the same courses under the same professors as Harvard itself, but with meager equipment and social isolation. Barnard College, and recently the Yale graduate department, have recognized the principle of coeducation in a restricted form.

The tendency to provide the same kind of education for women as for men, and the desire to preserve that intangible quality, womanliness, were constantly at variance in all these different methods, producing some unexpected results. Here and there women who were coeducated specialized. Perhaps Ph. D.'s of Zurich, after a short and brilliant career, fell in love in a hopelessly feminine manner, married, and apparently wasted all their intellectual achievements in cuddling babies and training the immigrant domestic; all this without any sign of discontent or domestic tragedy. On the other hand, as many sweet, feminine, docile creatures from the women's colleges, whose femininity had been preserved to ideal sweetness, went into law or medicine, declined to marry at all, and lived happy, unregretful lives.

The same contradictions were to be found among educated men. The farmer's boy who had taken a course in scientific agriculture refused to farm and went into journalism; the college professor's son failed in the classics, but made a fortune on a Western cattle ranch; the orthodox became the heterodox, and, behold, everything was topsy-turvy! Given a boy, a girl, and a curriculum—results: The boy a poet, the girl a lawyer, and the curriculum something which had somehow missed fire! No anxious parent or zealous professor could be sure of the effect of a given training.

Into the midst of this uncertainty the elective system was projected by one of the most conservative of Eastern colleges; it said, "Let him follow his bent." The thought spread like contagion to the coeducational colleges, where traditions were less fixed, and gradually to the older men's colleges as well; but not to the women's colleges. If a girl followed her bent, who knew what might happen? She might become too "learned for the

common uses of life." The fear that she will not marry was less alarming than the thought "men will not marry her." The elective system meant freedom of choice, the inevitable result of which is freedom of life. Intelligent men saw clearly that an intelligent, highly-educated woman might possibly hesitate to sacrifice the pure delights of scientific learning for the pettiness of domestic routine and the satisfactions of burden-bearing motherhood. Therefore she must not be *too* highly educated, lest freedom turn her from her proper sphere.

In our day the cry of alarm has again been raised; more and more women are coming up to the doors of the colleges; if intelligent women do not marry, the future of this race is uncertain, and civilization itself is in danger. Some would even make this question the test of the varied systems of education for women, in the hope of finding one which may be labeled, "Warranted not to divert women from marriage!" But the problem is neither so imminent nor so serious as many suppose. Two thirds of all women graduates marry; the one third who do not are an infinitesimal part of the thirty million five hundred thousand women in the whole United States. The one third in our day have, on the whole, as good a chance to obtain a suitable training as men in the same lines. They specialize and find growth and contentment in the sense of power and usefulness. It is not their destiny which should concern us, but rather the destiny of the other two thirds who do marry. The question arises, Does their college training bear so definite and satisfactory a relation to their afterlives? I fear not. It is constantly impressed upon a boy during these four years that he must find out what he is good for; he must either be fit or ready to be fitted to do something which will have a definite market value. But the destiny of the girl who goes to college is carefully concealed from her. During these four years, who says to her: If you marry, you will need biology, the sciences of life and reproduction; hygiene, the wisdom to attain and preserve health; sociology, the laws which govern individuals in society; chemistry, physics, economics, all the sciences which may help to solve the problems which the housewife must meet; literature and language, the vehicles of poetry and inspiration? No one has the courage to suggest any of these as suitable—nay, absolutely essential—to the successful fulfillment of her probable vocation in life. Young women are turned blindly adrift among a mass of subjects, with no guide but a perverted instinct, and with many a hindrance in the shape of tradition and ridicule. In all ages men have united in adoration of the dignity of domesticity and the sacredness of motherhood, yet any loving, foolish, untrained, inefficient creature has been held good enough to be a wife and mother. We do not ex-

pect a man to become a distinguished engineer or a professor of Latin by studying a little literature, history, music, and language; yet we expect a woman to undertake an occupation for which, in this age at least, a certain definite kind of training is necessary, without anything more applicable than "general culture."

The want of co-ordination between training and the needs of life in the education of women has repeatedly brought into question the desirability of the higher education at all for a woman who is to return to the home. As a result, there is a distinct tendency to demand a differentiation in the education of women. The recent proposal of a new type of woman's college is, in fact, a demand for a separate technical school in which there shall be a liberal scientific training with special reference to their domestic occupations and functions.

This is, however, not a new idea. In all those State colleges in which agriculture and the mechanic arts are taught a similar problem and a like solution were presented. The farmers demanded that the agricultural colleges teach how to plow, sow, and reap, rather than how to think; as a result, many of these institutions are to-day little more than high schools, with manual training added. In others it was perceived that, to make a successful farmer or engineer, a man must have the power to think clearly, accurately, effectively on any subject. The best agricultural colleges give little beyond what may be called laboratory demonstrations in field and barn, while the most progressive engineering schools no longer attempt to turn out skilled mechanics. Teachers of these subjects prophesy the complete elimination of shop work and practical farm operations from university courses, and their relegation to the position of entrance requirements.

Shall, then, the woman's college be a technical school, where she may learn all the practical details of housekeeping and sanitary science? It is the same problem, and must also be answered in the negative. Technical schools, wherever outside the university atmosphere, show a fatal lack of breadth. Physicians with only the training of the medical school, engineers with no ideas beyond their own specialty, farmers who despise *pure* science, housewives who are only perfect housekeepers, are the inevitable product of a purely technical education.

While such propositions as this are being widely discussed, the true solution is coming by a natural process. Within the boundaries of the new universities a few courses are offered to meet the specific needs of women's occupations. What women need is not to know how to cook, and wash, and lay a table, but how to think out clearly, accurately, and effectively any problem

which they may meet in every-day life. As the numbers of women in the universities increase, and the influence of educated wives and mothers is more widely felt, there will be an adaptation of university work to the needs of women as well as of men. The now scarcely perceptible tendency to emphasize the profession of wifehood and motherhood in its proper relations will be increasingly controlling in all education of women. Surrounded by the atmosphere of generous culture, molded by men and women of varied abilities, guided in the special preparation for her future, the young woman will soon be able to obtain as broad and as specialized a training as her profession shall require—a training which shall put her in touch with the best of the world for the benefit of her home and her children.

CONSUMPTION CONSIDERED AS A CONTAGIOUS DISEASE.

By A. L. BENEDICT, M. D.

A FEW years ago the newspapers were discussing rumors of the advent of leprosy in this country. Many were apprehensive of an epidemic of this disease, whose very name suggests all that is unclean, horrible, and loathsome. Although official reports made it certain that the lepers who had reached our shores were few, and that comparatively simple precautions could prevent the spread of the disease, public sentiment demanded the most rigorous quarantine and the sending back of those lepers who had already landed.

But there is in our midst another leprosy whose victims we meet, not outside the city wall warning us of their presence with the cry "Unclean! unclean!" but who walk the public streets, whom we meet in our places of business and amusement, in social gatherings, and, too frequently, in our very homes. It is doubtless a surprise that consumption should be mentioned in terms applicable to leprosy, but investigation shows that a close analogy may be drawn between the two diseases. Consumption or phthisis, as either word implies, is a consuming or wasting disease, characterized by a progressive failure of strength and an almost certain tendency toward death. Although the exact lesions differ in different cases, the essential nature of consumption is in inflammation, excited by a small germ which, magnified five hundred times, is just visible as a minute hyphen, usually tilted up at one end.

The same germ—the *Bacillus tuberculosis*—may lodge in bones, joints, the intestines, the membranes of the brain, and, in fact, in

almost any part of the body. Thus, consumption is only a special manifestation of the general disease—tuberculosis. The germs are not merely thorns in the flesh, producing a local inflammation, but they are plants which multiply rapidly, and form in their growth poisons as dangerous to life as if they were elaborated in one large plant instead of millions of small ones.

The germ of leprosy is very like that of tuberculosis. In both diseases, little masses of inflammatory tissue form around the bacilli, and then, not having the vitality of normal structures, these break down, involving other parts in their own destruction. Leprosy attacks chiefly those parts of the body which are exposed, like the hands, feet, arms, and legs, though it occasionally invades the mucous membranes, and it is seen in the nose, mouth, and throat. Tuberculosis, on the other hand, seeks the deeply seated organs by preference, though it, too, may affect the throat; and many of the so-called scrofulous sores are tubercular. Leprosy thrusts out its hideous deformities and disgusting ulcers to the gaze of the passer-by; tuberculosis hides its devastations beneath an exterior which may be even beautiful. The greater sufferer from fever, lassitude, and pain is the consumptive. So, too, is his mental suffering greater, since the leper is usually a person who has lived in filth and squalor, while the tubercular patient is more likely than not to be one who has worked hard to gratify some ambition and who feels more keenly than bodily pain the necessity of abandoning active life. Leprosy is not a rapidly fatal disease, usually lasting from nine to twenty years after its recognition. Consumption fortunately does not allow its victims to linger so long, but kills in from one to four years in the great majority of cases.

In order to see how formidable an enemy we have in tuberculosis, let us contrast it with some other diseases which are even more dreaded. Leprosy is rare in most civilized countries; even in Asia Minor it causes less than one per cent of the total death rate. Typhoid and scarlet fevers are each held responsible for three per cent; diphtheria and pneumonia, for five per cent each. The deaths from consumption alone, omitting such tubercular troubles as hip-joint disease, Pott's disease of the spine, some forms of meningitis, intestinal marasmus, caries of bone, and many abscesses, make up, according to one authority, about twenty per cent of the total death rate of this country. It is estimated that one third of all deaths occurring in the medical wards of hospitals are due to tuberculosis, and that a fifth of all surgical cases treated—many of which are cured—are tubercular. We may bring these statistics home by saying that you and I were born with one chance in five of dying of some form of tuberculosis. If our chance of being instantaneously and decently killed by an

electric shock were one in five hundred, we would turn the wheels of progress back twenty years rather than allow an electric light or a trolley car to threaten our safety. No pains and no expense are thought too great in maintaining a quarantine against cholera, smallpox—which the sensible part of the community is already vaccinated against—diphtheria, and the like. Large appropriations are made that there may be tried a yet unproved defense against diphtheria, but to the insidious enemy that numbers its dead by hundreds where these other open foes count theirs by scores we are blind. It is time that the veil should be drawn from the loathsomeness of "the great white scourge," that the false sentiment which poetry and prose have thrown over infection, blood poisoning, suppuration, and decay should be dissipated.

In the case of a disease so fatal and so general as tuberculosis, the considerations of cause and prevention become all-important, especially since few cases are curable. The most sanguine authority on the subject—a New York physician whose patients can command every means of relief, and who usually seek medical advice at the first suspicion of illness—claims to cure only one consumptive out of six. Most physicians would consider this an extremely high proportion, while with regard to well-established cases there is no question that all or nearly all end in death.

It has been demonstrated by the experimental inoculation of guinea-pigs and other animals that the tubercle bacillus needs no dormant period outside the body—such as is requisite for certain other germs—but that the disease is directly transmissible. There are two factors in the establishment of any disease—the presence of the germ and a certain predisposition. It is not a metaphor but a plain statement of fact to compare the former to the planting of a vegetable, the latter to the adaptability of the soil. Some germs will thrive only under the most favorable conditions, others will grow in almost any person. In other words, some diseases are liable to occur only under definite circumstances of predisposition, and these may be readily prevented, while others are virulent, attacking whole communities at once. Fortunately, the latter usually "exhaust the soil," so that if the patient recovers from one attack he is not liable to a second, though there are exceptions to all such rules. Measles, scarlet fever, smallpox—in fact, nearly all the eruptive fevers—find the proper soil in almost every body, but the something on which they thrive is exhausted, so that thereafter an immunity exists. Tuberculosis never "exhausts the soil." Even if the patient recovers—as not infrequently happens in surgical cases, hip-joint disease, inflammation of bones, etc.—he is always liable to a subsequent attack of tubercular disease, not necessarily in the same organ. On the face of the matter it would seem that a germ that kills a fifth—or, to give

the lowest estimate, a tenth—of the civilized human race is not very exacting as to the soil afforded. Yet until recently consumption has not been recognized as a contagious disease, and the factor of predisposition, as determined by heredity, lack of proper air and exercise, failure of vital strength, impoverished blood, "weak lungs," etc., has been considered paramount. It is certainly true that a robust person may be placed in the most intimate contact with the germs of tuberculosis and throw them off or inclose them as inert foreign bodies in his tissues; on the other hand, nearly every one is at one time or another susceptible to tuberculosis and escapes or becomes a victim according as he is free from or is exposed to contagious influences. A mother and her baby, for instance, both die of consumption and heredity is blamed. But does the child inherit the bacilli, or does it imbibe them in the milk—where they have been repeatedly found—or are they inhaled as the mother bends over the child and smothers it with kisses? Again, brothers and sisters drop off one after another, and it is said that "consumption runs in the family"; but we would seek another explanation if the same succession of deaths were due to scarlet fever. Tubercle bacilli have been found in the dust on the top of the door and window casings, in carpets, bedding, and wall paper. Is it not rational to suppose that these foci of infection have more to do with the death of successive members of the family than a hereditary taint? When we note that members of the family who leave home escape the disease and that other persons occupying the same house later contract it, is not the evidence tolerably clear? Are not husbands and wives, roommates, and other persons intimately associated almost as likely to follow one another with consumption as if there were a blood relationship? Such questions can only be fully answered by a careful collection of statistics, taking advantage of the experiments of chance; enough evidence has been already gathered to warrant the adoption of the contagiousness of tuberculosis as a practical basis for preventive measures.

The predisposing tendencies to tuberculosis may be modified, often absolutely removed, by hygienic and tonic treatment. If, however, any systematic attempt is to be made to stamp out the disease, such an attempt as has been eminently successful in the case of cholera and smallpox, it must depend upon isolation and disinfection. We may logically hope to be able to vaccinate against any disease which occurs but once in a lifetime—that is to say, we may dwarf the germs so that their growth will occasion no dangerous symptoms while they will still "exhaust the soil" so as to prevent a subsequent development of the corresponding unmitigated germs. This hope has been realized only in the case of smallpox, but it is quite likely that the bacteriological horti-

culturist may learn to dwarf the germs of scarlet fever, typhoid, and similar diseases. Diseases, on the other hand, which are essentially chronic, which remain or recur without a tendency to self-limitation, must be attacked in another manner. The failure of Koch's tuberculin was simply an illustration of this general principle.

At present the main obstacle to the carrying out of measures of quarantine against tuberculosis is public sentiment. Public sentiment requires all smallpox patients to be sent to a pest house, though, with rare exceptions, such patients can be of danger only to the ignorant who have refused vaccination. Public sentiment kept a poor Chinese leper confined in a bare stone cell with almost the same neglect of humanity as characterized the treatment of prisoners in the dark ages. Public sentiment checked immigration and commerce in the effort to quarantine against cholera. Yet this same public sentiment would characterize as barbarous the isolation of consumptives, with every provision for their comfort, in hospitals so arranged as not only to prevent the spread of the disease, but to afford every possible chance for the relief or cure of their inmates.

While yielding to the inevitable, something may still be done to limit the spread of tubercular disease without removing the consumptive from his customary associations. Barring surgical tuberculosis, in which the ordinary antiseptic dressings and the destruction of old bandages by fire will suffice, we have to contend against the dissemination of germs by the various excretions of the body. Fortunately, in the vast majority of instances we can restrict our attention to the expectorated matter. Few germs are exhaled in the breath, yet it is unwise for any one with a severe cold or bronchitis to be in the same room with a consumptive, and no one should sleep night after night in the same bed. If it is absolutely necessary for an attendant to sleep in the same room, the freest ventilation should be insisted on.

Our sleeping cars are, I believe, a positive source of infection. A considerable proportion of travelers are consumptives seeking warmer or drier climates. An almost equal number are persons predisposed to the disease, but not yet infected, going to the same resorts to escape our northern winters. Imagine such a person passing three or four days in the confined air of a palace car, with several consumptives sleeping in a berth whose hangings have been infected from the exhalations of consumptives on previous trips, and, on reaching his destination, spending a number of months at a hotel which is practically a hospital for consumptives! In many instances public hospitals are breeding places for tuberculosis, patients with various depressing ailments, including those that render the lungs particularly vulnerable, being assigned

to wards occupied also by consumptives. Such instances are more often due to lack of funds than to a failure to appreciate the danger.

The idea is apparently widely entertained that sidewalks and the floors of public conveyances and buildings are a sort of ever-ready cuspidor. The habit of ubiquitous expectoration—always disgusting and unnecessary in health—becomes dangerous when practiced by consumptives. Sweeping trains catch a surprising amount of filth, and tubercle bacilli as well as other germs have been found in the skirts of ladies' dresses, whence they may be introduced into houses. How often do we see a consumptive shivering over a register and dropping the scourings of the cavities in his lungs down the hot-air pipe, to be dried and disseminated throughout the building! An apparatus, differing only in detail from the ordinary register, is used in laboratories for the experimental inoculation of guinea-pigs with tuberculosis.

On the other hand, the consumptive must not swallow the infectious material raised from the lungs, for, by so doing, he might set up tubercular inflammation of the stomach and intestine. The expectoration should take place into a cup that can be readily disinfected, or into a waterproof-paper receptacle that can be burned. For disinfection, strong carbolic acid or a solution of zinc chloride may be used, and the disinfectant must remain in contact with the sputum for a long time; preferably the cup should always contain some of the solution. For use away from home, pocket cuspidors, or those fitted into canes, may be used. The sputum should never be allowed to dry. Handkerchiefs, sheets, etc., should be boiled for at least half an hour—so resistant are the tiny plants that cause the trouble—apart from other clothing.

The communication of tuberculosis through cow's milk is at length obtaining the attention that it deserves. Milk once infected can not be made safe except by such treatment as will seriously interfere with its nutritious qualities. Ordinary germs of putrefaction may be killed by boiling, or even by letting the milk stand in water previously brought to the boiling point, but the only satisfactory dealing with tuberculous milk is destruction at the hands of Government inspectors.

So long as tubercular patients are allowed the freedom of social intercourse they must be held to the moral obligation of certain restrictions. Kissing has been called an elegant method of transmitting disease. Consumptives must hold their affection in check; above all, they must not kiss little children, whose resistance to disease is slight. They must recognize the necessity, if they are not to be isolated from their surroundings, of isolating from themselves children and those at all inclined to tubercular

trouble. Cleanliness of habit and thorough disinfection of sputum must largely depend upon the conscientiousness of consumptives themselves. All these precautions involve a great amount of self-sacrifice on the part of those affected with this terrible disease; they necessitate the realization of certain facts which we would gladly keep from the sufferer; they demand a sacrifice of sentiment on the part of those near and dear to the patient. To this extent the attempt to exterminate the greatest plague of civilization is cold-blooded. But a worse alternative confronts us. So long as we neglect to consider tuberculosis as a contagious disease, though not so conspicuously so as the eruptive fevers; so long as we occupy homes in which the germs of this disease linger, neglecting to disinfect, repaint, and repaper; so long as sick and well mingle without an effort to destroy the virus, so long will the great white scourge shorten valuable lives and bring mourning on millions. Because its foulness is concealed, because it strikes painlessly and its wound is not felt for weeks or months, because it does not mark its victims in letters of red or choke them in a week with a visible mass of poison, shall we ignore the fact that this insidious, relentless foe is the chief lieutenant of Death?

THE PAST AND FUTURE OF GOLD.

By CHARLES S. ASHLEY.

IT is, I think, universally claimed by advocates of the free coinage of silver that the so-called demonetization of silver has led to an appreciation in the value of gold; and that this appreciation has worked grievous hardship to the debtor, or, what is largely the same, the producing classes, who are thus obliged to pay in a more valuable currency than that in which their debts were contracted. The claim is that, by an artificial change in the value of the dollar, the farmer has to produce twice or three times as many bushels of wheat as formerly to pay off his mortgage. The resulting embarrassment of the debtor classes has, in this view, spread among other classes, and has led to panics and long-continued depression in business. Aside from the natural desire of the silver miners to have their product doubled in debt-paying power, this is the whole basis of the silver agitation.

If one were to say that for this theory, upon which an international agitation has been built, and which is countenanced by a large number who have given the matter considerable investigation, some of whom are generally reputed to be competent for the purpose, there is absolutely no foundation in fact, and that, so

far from there having been a rise in the value of gold, there has been an appreciable fall, he might be thought to take an extreme position. To that position, however, a careful examination of the facts has led me; and this article is written to present the evidence on the question.*

To ascertain the value of gold, two sources of inquiry are open: First, what is the comparative standing of gold in the mass of commodities, such as labor, land, agricultural products, manufactured products, etc.? Second, what are the influences directly affecting the value of gold, such as rate of production and relative demand for its use? In considering the evidence on the first point we must be careful to bear in mind what our silver friends generally, if not always, ignore—i. e., the influence of railways and inventions in cheapening products. Kerosene sold at Toledo forty years ago for seventy-five cents a gallon; recently as low as five cents. If, then, we ignored all other commodities and the influence of discovery, we might reach the absurd conclusion that gold had appreciated fifteen times and silver seven and a half times in forty years. So with the value of wheat and cotton in Liverpool. Improvements have cheapened transportation so vastly that, though the Ohio farmer now gets more for his wheat and corn than he did in the "forties," those products sell in Liverpool for one third the former price. So this low price in Liverpool does not mean that gold, as compared with wheat and corn, has risen. It merely registers the force of other circumstances. In using this method of comparison, therefore, we must be careful to consider not simply present as compared with former prices, but also other matters affecting market values; and it is best, whenever possible, to make comparison with commodities where the methods of production and transportation are comparatively unchanged.

I. For the purpose of comparison we shall go back a period of fifty years, and by observing the change in price-level of a given amount of gold we shall have pretty clear evidence of its rise or fall. Such a method ought to meet with acceptance by the silver men, because they are, I think, universally fond of asserting that for hundreds of years the "bimetallic standard" provided a good currency, free from all objections, and that our great

* Never until the past few months have the "gold" men seemed to put forth their case in public argument. Their feeling seemed to be that the silver agitation was a piece of childish folly which required simply a little soothing talk about international bimetallism and "increased use of silver," and other Utopian schemes. Accordingly, the silver men have really had the field to themselves, and have filled the air with talk about the "appreciation" of gold, "the crime of '73," etc., almost without contradiction; so that the public mind has given far more credit to these fairy tales than could otherwise have happened.

object is to reverse the current of events and return to the practice of the past, from which the nations have one by one unfortunately departed. The "bimetallic standard" was in force in the United States fifty years since—so it is claimed—although the actual standard of the country after 1834 was gold, and less silver was then coined in a year than has been issued of late years in a month or even in a week, because the gold constituting a dollar could be bought slightly cheaper than the silver in a silver dollar, and therefore, though the coinage of silver was nominally "free," it had really ceased to be "basic money" long before the "crime of 1873" had been thought of.* If, now, the evidence shows that the existing standard of value, or "basic money," has lost instead of gained in value since the days of the "bimetallic standard" of glorious memory, then the complaints and theories of the free-silver men are without any solid foundation; and the existing agitation is like all agitations destitute of justice, simply a hindrance to the establishment of firm confidence and prosperity, and, in short, an unmitigated nuisance with which no compromise should be made.

It is a singular fact that the method of showing that the general level of prices has greatly fallen, and that therefore the gold dollar has risen, is to take the statistics of prices in great centers as a final basis. Wheat is cheaper in London in 1895 than it was in 1845—much cheaper; so is cotton, so is corn—the three great staples. Therefore, say our friends, gold has risen, and the debtor, the farmer, and the producer are robbed! This, with a little bogy-talk about Shylocks, England, and Wall Street, is all there is of their argument.

Now, if we ask what the Ohio farmer received fifty years ago for his wheat and corn, we come upon the fact—which must be a disagreeable one for the cheap-money men—that he did not get as much then as he does to-day. No books of statistics take any account of the prices obtained by the Ohio farmer in 1845; and our statistical friends, overlooking (or "remembering to forget") the difference in transportation and other conditions then and now, conveniently assume that because wheat was higher in London in 1845 than now, the Ohio farmer must have been rolling in wealth. In the forties, the Ohio farmer seldom got twenty cents a bushel for his corn, and frequently burned it up; and men still living can remember how, in those

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* This fact, which must be well known to men like Senators Teller, Jones, and Stewart, renders it difficult to acquit the leading advocates of free coinage of deliberate hypocrisy, when they so loudly declaim about "the crime of 1873" (which Senator Stewart himself voted to enact), and the "dollar of our daddies," which was practically non-existent.

glorious bimetallic days, the farmer got but twenty-five cents a bushel for his wheat. In those times the western farmer lived chiefly by consuming his own products, buying almost nothing. It is too clear for argument or dispute that it has been railroads, telegraphs, produce exchanges, and such-like means of facilitating exchange, and not gold or silver, that have caused the fall of the great staples in commercial centers—a fact easily verifiable by any western man who will consult the oldest residents of his town.

In a late number of The Forum, that excellent statistician, Mr. Edward Atkinson, has given a most interesting table which, in the present connection, I can not do better than copy. The table was constructed to show at a glance the variations in price of the principal commodities as expressed in gold.*

Prices, Wages, Purchasing Power.

	1845.	1860.	1865.	1870.	1880.	1890.
Meat	79·4	100	197·0	174·3	103·6	99·6
Other food	82·8	100	240·3	146·3	116·9	103·5
Cloths and clothing	97·1	100	299·2	139·4	104·5	82·4
Fuel and lighting		100	237·8	196·5	100·2	92·5
Metals and implements	110·8	100	191·4	127·8	96·3	73·2
Lumber and building material	106·7	100	182·1	148·3	130·9	123·7
Drugs and chemicals	121·0	100	271·6	149·6	113·1	87·9
House furnishings	102·3	100	181·1	121·6	85·2	69·5
Miscellaneous	114·8	100	202·8	148·7	109·8	89·7
Average of all prices	102·8	100	216·8	142·3	106·9	92·3
Average of all wages	86·8	100	143·1	162·2	141·5	158·9
Average wages by importance	85·7	100	148·6	167·1	143·0	168·2
Salaries of city teachers	74·8	100	134·7	186·3	182·8	186·3
Paper money	100·0	100	49·5	81·1	100·0	100·0
Gold price of silver bullion in London	95·3	100	99·0	98·2	84·7	77·4
Purchasing power of wages	84·4	100	66·0	114·1	132·3	172·1

In brief, the table shows that the prices of many commodities rose very much between 1845 and 1865, and afterward fell a little lower than the 1845 level; while wages, on the contrary, not only did not recede, but continued to advance after 1865. It shows another interesting fact—*that* 1865 *is the date when prices began to fall, and not* 1873; and thus discloses the purely artificial nature of the effort to make the era of cheap prices coincide with the "demonetization of silver" in that year.

In Mulhall's History of Prices (page 7) the author brings together in a short comparison a statement of the views of various authorities on the subject of the rise and fall of prices.

* For the excellent discussion as to the price variations of the different commodities, the reader must be referred to the article itself, which is a good antidote for the reckless assertions and hasty theories current on this subject.

Years.	Soetbeer.	Jevons.	Laspeyre.	"Economist."	Mulhall.	Medium.
1845 to 1850	100	100	100	100	100	100
1851 to 1855	114	107	111	...	104	109
1856 to 1860	125	120	122	127	105	120
1861 to 1865	127	120	123	...	110	121
1866 to 1870	125	121	...	140	111	124
1871 to 1875	136	...	...	127	112	125
1876 to 1880	127	...	...	115	99	114
1881 to 1884	124	...	...	105	92	107

A study of any of these tables will convince one that there is an enormous exaggeration in the way the cheap-money men talk about the fall of prices. While there has been to some extent a fall in the price of most products in centers of trade, it is by no means very extensive or portentous.

According to Mulhall (History of Prices, page 7), cotton in the United States averages thirty-three per cent higher in 1881–'83 than in 1841–'50; and wheat two per cent higher. Owing, however, to the great fall in transportation, and to improvements in agricultural machinery, the farmers' increased remuneration is by no means expressed by these figures. For corn the showing is still better, probably amounting to something like one hundred per cent for the average American farmer. During the same period pork has risen fifty-six per cent; tobacco, forty-four per cent; butter, forty-five per cent, and cheese eighty per cent—all in centers of distribution, while they have risen still more in the hands of the producer. If my personal recollection is at all reliable, we pay in Toledo, Ohio, to-day more for eggs, chickens, potatoes, and fruits than twenty years ago in greenbacks. Thus, by a little discrimination, we see that the "great fall in prices," so often and so lugubriously spoken of, is in the great centers where the consumers and not where the producers live. Instead, therefore, of being a calamity, this fall in prices has been an unmixed blessing. The farmer gets more for his product; the city man pays less. Such has been the result of the construction of railroads, the most beneficent and far-reaching of all practical inventions. And yet, with locomotive whistles reaching well-nigh every ear in the country, from lines of railroads having a mileage of nearly one hundred and seventy thousand in the United States, our free-silver friends ignore their existence, and, on the basis of London prices in former times, build up a purely imaginary farmers' paradise in contemporary America.

The evidence afforded by wages shows either that the money standard has not risen, as claimed, or that the working classes have received an astounding increase of wages. Take the trades in which the conditions are wholly or comparatively unchanged

by modern inventions, and in a country where no economic revolution has occurred—England:*

Year.	Shillings per week.		
	Blacksmith.	Mason.	Carpenter.
1740	16	16	15
1840	21	23	20
1880	32	35	30

Thus wages are seen to have advanced about twice as much in the forty years, 1840 to 1880, as in the previous century. In the United States Mulhall gives tables (Dictionary of Statistics, page 463) showing that operatives' wages have risen from two hundred and fifty to three hundred dollars per annum in the thirty years beginning with 1850. Even during the last few years, in spite of the depression prevailing, I very much doubt if wages and salaries have, taken as a whole, declined at all, or at any rate so much as is usually supposed. Only a few days since I read in a newspaper of the city in which I live a table showing that the salaries of teachers in the public schools had had a steady average increase during the past four years; and the increase was not confined to any one year, but continued gradually through the whole period. However this may be, we can not turn to any reputable authority which does not show that a large increase of wages has occurred during the past fifty years in every civilized country. If, therefore, "gold has risen fifty per cent" in value, the working classes have had a far more wonderful advance than they or any one else supposed.

Again, real estate is one of the greatest of commodities, and if the dollar has increased in value it ought to be reflected in the fall of real estate. No such fall has, however, taken place. Farms in the United States, irrespective of cattle, implements, etc., rose from two hundred and fifty dollars per inhabitant to two hundred and eighty dollars per inhabitant during the thirty years ending in 1880†—a fine increase, considering the accompanying increase of population.

Another consideration is of far greater weight than any derived from a single commodity. If land rises in value, the rent increases; if money rises in value by reason of scarcity, the rate of interest advances. If, then, the combined Shylocks of the world, together with the banks, England, and Wall Street, have "demonetized silver" in order to "corner money" and boom the rate of interest, there ought to be traces of it. Singular as it may be to our silver friends, there seem to be none. In fifty years the

* Mulhall, Dictionary of Statistics, p. 461.

† Ibid., p. 9.

average rate of interest in the United States has been about cut in two. The best railroad bonds formerly bore seven and ten per cent interest; now they bear four and five per cent. The same proportion holds good of United States bonds and of municipal indebtedness. Every decade has seen a great decline in the rate of interest. If, now, money is getting scarce, and if, as our silver friends claim, the quantity of money regulates its value, then interest should be three or four times as high as we find it. While I do not claim that the fall of interest, which has taken place in Europe as well as America, absolutely proves that the value of money has not risen, I do think it very good evidence of the fact; and it certainly shows that the "bankers' conspiracy" theory of the free-silver men is one of the wildest ideas ever put forth by men outside of insane asylums.

II. Having briefly considered what may be called the direct evidence bearing on the subject, it remains to consider the indirect—the circumstances occurring during this half century which would naturally have an influence on the value of gold money. One of the most prominent of these is the growth of banks and the popularization of checks. The first English bank was established just two hundred years ago. "Since 1840 the banking of the world has increased about eleven fold—that is, three times as fast as commerce, or thirty times faster than population."

In 1870 the Bank of Germany did about seventy-five times the business it transacted in 1820. A like state of affairs prevails in the United States. A very large proportion—some say ninety-five per cent—of the country's business in done by checks which supply the place of currency, and diminish to their extent the necessity of the use of gold. Fifty years since comparatively little business was done through banks. In this way the currency, while maintaining its quality, has been vastly expanded; so that the actual currency (counting checks) circulating in the United States to-day is perhaps one hundred times what it was in 1845. Banks and the use of checks also save the loss of gold arising from shipwreck and other accident, and, by storing it quietly in vaults, save the loss by abrasion which would occur if it were actually used in business.

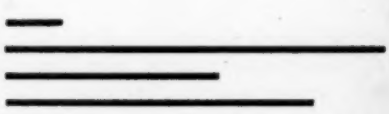
A great economy in the use of gold has been made by modern electroplating inventions. Few things are now made of solid gold. Solid gold watch cases are superseded by "filled," which are stronger and wear sufficiently well. Plate, too, has largely gone out of style, a circumstance which is a principal cause in the decline of silver. "Official returns of silver stamped in Great Britain for plate and ornament show an annual average of 1,091,-

000 ounces in the years 1821–'50, and only 790,000 ounces in the decade ending 1880." *

But the most tangible and solid evidence that can be found on the subject lies probably in the history of the production of gold. On page 174 of the Report of the Director of the Mint for 1894 is a table giving a statement of the annual product of gold from the discovery of America. It may be summarized as follows:

Periods.	Average annual product.
1493 to 1520	$3,855,000
1701 to 1720	8,520,000
1801 to 1810	11,815,000
1850 to 1855	132,513,000
1890	118,849,000
1893	157,222,000

Prior to the Californian period the average product for three hundred and fifty years was about $8,794,000. Before 1493 it was still less. The value of gold therefore—its standing relatively to other commodities—may be said to have been determined by this long-continued rate of production. Then almost in the twinkling of an eye came the Californian and Australian discoveries. The annual product of gold became nearly twenty times what it had been: and this rate of production has not only been substantially maintained, but is now showing a rapid increase. The extraordinary contrast between the annual product of gold prior to and after 1850 deserves a diagram:


World's annual product of gold, 1493 to 1850.
World's annual product of gold, 1850 to 1893.
Total product, 1493 to 1850, $3,158,233,000.
Total product, 1850 to 1893, $5,240,878,000.

It is therefore difficult to imagine that gold has appreciated fifty per cent, or to any other extent, in the face of this wonderful and continuous production.† The facts above stated—its standing relative to labor, land, and commodities not greatly affected by modern conditions, the economy in its use effected by banks and checks, and its novel rate of production—lead me, on the contrary, to think that since 1845 gold has suffered a slight decline, some-

* Mulhall, History of Prices, p. 11. "Notwithstanding the great increase which has taken place in the means of all classes during the interval, the average Englishman of the present day consumes less gold than the Englishman of fifty years back." (J. E. Cairnes, Essays, p. 134.) M. Chevalier likewise finds a decrease in the consumption of gold for tableware purposes during the present century, both in England and France.

† J. E. Cairnes (Essays, p. 115) states the gold production of the three hundred and fifty-six years from 1492 to 1848 to have been, in round numbers, £400,000,000—an amount nearly supplied, as he states, every decade at the present rate of production.

thing like twenty-five per cent.* The decline was much discussed and feared about 1855, owing to the then novel rate of production; but men get used to all wonderful things, and cease to consider what they get used to. Nevertheless, the force of vast production continues to operate year after year.†

So much for the past of gold; now for its future. In 1877 Dr. Suess, of Austria, an eminent geologist, startled the economic and financial world by proving to his own satisfaction that the world's production of gold was destined to decrease and in no very long time to become insignificant. His theory was based on the fact that gold, being one of the heaviest metals, would naturally, during the molten period of the earth, have sunk very far from the surface—too far to be mined successfully. This theory, though not corroborated by any direct or historical evidence, obtained considerable currency, and was an important factor in promoting the sentiment for bimetallism.

Like the other scientific theory that no man could ride a two-wheeled vehicle because of the perpetual tendency to fall over, and another, supposed to be based on the laws of motion, that a ball-pitcher could not "curve" a baseball, this theory has proved to have no foundation in fact. It is now evident that the production of gold for the next fifty years will be altogether unprecedented. This production has been vigorously stimulated by fresh discoveries of mines, by new and cheap mining processes, and by the fall of silver, leading miners to pay greater attention to the other metal. The operation of the latter factor is best seen in

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* M. Chevalier, in his once celebrated book on the Depreciation of Gold, says that since 1492 silver has fallen in the ratio of six to one and gold four to one—i. e., that gold is worth only twenty-five per cent what it was in 1492.

† In volume clviii of the North American Review, p. 464 (April, 1894), President E. B. Andrews, of Brown University, asserts that "it is universally admitted that since 1873 there has been an extraordinary appreciation of gold." This is a very easy way to settle a question. For my part I do not think there is much more evidence of a rise since 1873 than since 1845. Land has risen, wages have risen, cheese, butter, eggs, beef, and many other commodities have risen, and interest has fallen—all going to show that gold has continued to fall. The only commodities which have fallen greatly are those like iron, in which great inventions have been made, tending to reduce the cost of production, or, like coal, where the extension and improvement of railways, canals, and telegraphs have quickened and cheapened transportation. The Suez Canal, Indian railways, and western railroad building in the United States have naturally had a profound effect on the prices of wheat, corn, and cotton. In Mr. Atkinson's article, above referred to, this claim of an appreciation of gold since 1873 is not admitted, but controverted. Instead of being "universally admitted," this alleged appreciation is, in my opinion, generally denied by the best authorities on the subject, among whom Mr. Atkinson stands high. It is true, however, that gold has not depreciated since 1873 so fast as in the fifties. The reason is not far to seek. The production of the Californian period was extremely sensational, so long as it was new, and led men to fear that gold would be a drug in the market—thus "bearing" the price of gold.

Colorado, where the production of gold rose from $5,300,000 in 1892 to $7,527,000 in 1893, and to about $12,000,000 in 1894. The production for 1895 in Colorado is confidently expected to reach $20,000,000. The Director of the Mint is of opinion that the production of the United States rose from $33,014,981 in 1892 to about $39,500,000 in 1894, while other good authorities put the production for 1894 at $50,000,000. The annual product of other great producing countries shows a large increase of late years. In his notable article in the North American Review,* Mr. Preston states that the world's production of gold for 1893 was "the largest in history, amounting in round numbers to $155,522,000." The product for 1894, however, very largely exceeded—probably by twenty-five per cent—the product of 1893. There is scarcely any assignable limit to the gold known to exist in the world or even in the United States. It is said that simply by the removal of the restrictions on hydraulic mining California can produce half a billion of gold. The quantity easily obtainable in Colorado is stupendous. Other parts of the United States are also rich, while Australia and Russia probably possess a stock equal to our own, and are increasing the annual output every year.

But the most surprising and, so to speak, revolutionary facts regarding gold that have recently come to light are those concerning the great Witwatersrandt mines of South Africa. There gold is found in enormous quantities and in a cheaply workable form in a new geological situation—"in strata the component parts of which are pieces of quartz held together by a clayey cement." A part of this tract—about one fifth of the whole—has been separately explored by a mining expert sent by the German Government and by a distinguished American mining engineer, Mr. Hamilton Smith. Each of these gentlemen concluded that the minimum amount of gold obtainable from the tract surveyed was upward of a billion dollars. These mines began production in 1887, when their product was about $500,000. In 1893 it was nearly $30,000,000. It is therefore not hazardous to predict that from this one mine will come in the near future enough gold to double the total existing stock of about $4,000,000,000.

There is therefore, in my opinion, not the slightest fear of an appreciation of gold arising from its scarcity. It is as certain as anything can well be that the abundance of gold will be such as not only to prevent a rise in its value, but materially to accelerate its fall. It is not probable that the increased production will be relatively as great as that of the Californian period; but the absolute increase may well be larger, and it would not be surprising to see an annual production of $300,000,000 worth of gold by the

* January, 1895, p. 46.

end of this century. The real danger is that gold will fall so much as to cause a contraction of credits; for no one will voluntarily give credit in a falling commodity or depreciating money standard. As the greater part of the world's business is done on credit, this possibility is most serious. It would be difficult to borrow large sums on long time for the construction of railways and other great works if capitalists were convinced that after ten or twenty years they would receive in full payment of a dollar of the present value of one hundred cents a dollar of the value of seventy-five cents.

Probably, however, the world will soon get used to the great increase in gold production, and cease to pay any attention to it, as was the case in the Californian period. Now, as then, we may expect that the vast gold production now going on will result in a rise of the general price level, in wages, and in the great relief of the debtor class. Barring the possibility of foolish experiments in currency legislation, which, in spite of much noise in irresponsible quarters, is but small, we are entering on an era of great prosperity, where all business will sail along triumphantly on an ever-rising tide of gold.

PROFESSIONAL INSTITUTIONS.

VII.—JUDGE AND LAWYER.

By HERBERT SPENCER.

IN the preceding division of this work, and more particularly in § 529, it was shown that in early societies such regulation of conduct as is effected by custom, and afterward by that hardened form of custom called law, originates in the expressed or implied wills of ancestors—primarily those of the undistinguished dead, and secondarily those of the distinguished dead. Regard for the wishes of deceased relatives greatly influences actions among ourselves, and it influences them far more among savage and semi-civilized peoples; because such peoples think that the spirits of the deceased are either constantly at hand or occasionally return, and in either case will, if made angry, punish the survivors by disease or misfortune. When, in the course of social development, there arise chiefs of unusual power, or conquering kings, the belief that their ghosts will wreak terrible vengeance on those who disregard their injunctions becomes a still more potent controlling agency; so that to regulation of conduct by customs inherited from ancestors at large, and ordinarily enforced by the living ruler, there comes to be added regulation by the transmitted commands of the dead ruler.

Hence originates that early conception of law which long continues with slowly increasing modification, and which, in our day, still survives in those who hold that Right means "that which is ordered"—firstly, by a revelation from God, and secondly by god-appointed or god-approved kings. For the theological view implies that governments in general exist by divine permission, and that their dictates have consequently a divine sanction. In the absence of a utilitarian justification which only gradually emerges in the minds of thinking men, there of course exists for law no other justification than that of being supernaturally derived—first of all directly and afterward indirectly.

It follows, therefore, that primitive law, formed out of transmitted injunctions, partly of ancestry at large and partly of the distinguished ancestor or deceased ruler, comes usually to be enunciated by those who were in contact with the ruler—those who, first of all as attendants communicated his commands to his subjects, and who afterward, ministering to his apotheosized ghost, became (some of them) his priests. Naturally these last, carrying on the worship of him in successive generations, grow into exponents of his will; both as depositories of his original commands and as mouth-pieces through whom the commands of his spirit are communicated. By necessity, then, the primitive priests are distinguished as those who above all others know what the law is, and as those to whom, therefore, all questions about transgressions are referred—the judges.

In small rude societies judicial systems have not arisen, and hence there is little evidence. Still we read that among the Guiana Indians the Pe-i-men are at once priests, sorcerers, doctors, and judges. Concerning the Kalmucks, who are more advanced, Pallas tells us that the highest judicial council consisted partly of priests, and also that one of the high-priests of the community was head-judge.

Though among the semi-civilized Negro races of Africa, theological development has usually not gone far enough to establish the cult of a great god or gods, yet among them may be traced the belief that conduct is to be regulated by the wills of supernatural beings, who are originally the ghosts of the distinguished dead; and in pursuance of this belief the ministrants of such ghosts come to be the oracles. Thus Lander tells us that "in Badagry the fetich-priests are the sole judges of the people." Cameron describes a sitting of Mganga, chief medicine man at Kowédi. After the chief's wife had made presents and received replies to her inquiries others inquired.

Questions were "put by the public, some of which were quickly disposed of, while others evidently raised knotty points, resulting in much gesticula-

tion and oratory. When the Waganga [apparently the plural of Mganga] pretended they could not find an answer the idols were consulted, and one of the fetich men who was a clever ventriloquist made the necessary reply, the poor dupes believing it to be spoken by the idol."

Of ancient historic evidence readers will at once recall that which the Hebrews yield.

There is in the Bible clear proof that the ideas of law and of divine will were equivalents. Their equivalence is shown alike in the bringing down of the tables from Sinai and in the elaborate code of regulations for life contained in *Leviticus*; where the rules even for diet, agricultural operations, and commercial transactions, are set down as prescribed by God. Still more specific evidence, elucidating both the general theory of law and the functions of the priestly class, is supplied by the following passages from *Deuteronomy*:—

"If there arise a matter too hard for thee in judgment, between blood and blood, between plea and plea, and between stroke and stroke, being matters of controversy within thy gates: then shalt thou arise, and get thee up into the place which the Lord thy God shall choose; and thou shalt come unto the priests the Levites, and unto the judge that shall be in those days, and inquire; and they shall shew thee the sentence of judgment; and thou shalt do according to the sentence, which they of that place which the Lord shall choose shall shew thee."

Moreover, beyond the often recurring injunction to "inquire of the Lord," we have the example furnished by the authority and actions of Samuel, who, dedicated to him from childhood was a "prophet of the Lord," who as a priest built an altar, and, as we see in the case of Agag, was the medium through whom God conveyed his commands, and who played the part of both judge and executioner.

Of course we may expect that Egypt with its long history furnishes good evidence, and we find it. Here are relative facts from three authorities—Bunsen, Brugsch, and Erman.

"That the oldest laws were ascribed to Hermes, implies however nothing more than that the first germ of the civil law sprung from the Sacred Books, and that it was based in part upon the religious tenets which they contained."

Mentu-hetep, a priest and official of the 12th dyn., on his tomb, "prides himself on having been 'a man learned in the law, a legislator.'"

"The chief judge was always of highest degree; if he was not one of the king's own sons, he was chief priest of one of the great gods, an hereditary prince."

"All the judges of higher rank served Mo'at, the goddess of Truth, as priests, and the chief judge wore a small figure of this goddess as a badge round his neck."

A court which held a sitting in the 46 of Ramses II consisted of 9 priests

(prophets and priests) and one lay member, the registrar. But in another case (Ramses IX) the lay element preponderated.

Which last statement implies a step toward differentiation of the secular from the sacred in local administration.

To the circumstance that the Greek States did not become fully united has already been ascribed the fact that the Greek priesthood never became a hierarchy. Says Thirlwall—"the Greek priests never formed one organized body . . . even within the same State they were not incorporated." Hence the normal development of sundry professions is less distinctly to be traced. Nevertheless the relation between the priestly and the judicial functions is visible in a rudimentary, if not in a developed, form. Among the Greeks, as among the Hebrews, it was the habit in cases of doubt to "inquire of the Lord"; and the oracular utterance embodying the will of a god was made by a priest or priestess. Moreover, the circumstance that Greek laws were called themistes or utterances of the goddess Themis, as the mouthpiece of Zeus, shows that among the early Greeks, as among other peoples, a law and a divine fiat were the same thing. That systems of law were regarded as of supernatural origin, is also evidenced by the code of Lycurgus. Says Hase:—"The origin of his code was religious. A declaration of the Delphic god contains the fundamental principles of the measures by which he reconciled the rival claims" [of the Spartans]. That the non-development of a legal class out of a priestly class followed from the lack of development of the priestly class itself, seems in some measure implied by the following extract from Thirlwall:—

"The priestly office in itself involved no civil exemptions or disabilities, and was not thought to unfit the person who filled it for discharging the duties of a senator, a judge, or a warrior. . . . But the care of a temple often required the continual residence and presence of its ministers."

Possibly the rise of priest-lawyers, impeded by this local fixity and by want of co-operative organization among priests, may have been also impeded by the independence of the Greek nature; which, unlike Oriental natures, did not readily submit to the extension of sacerdotal control over civil affairs.

How priestly and legal functions were mingled among the early Romans is shown by the two following extracts from Duruy:—

The patricians "held the priesthood and the auspices; they were priests, augurs, and judges, and they carefully hid from the eyes of the people the mysterious formulæ of public worship and of jurisprudence."

The "servile attachment to legal forms [which characterized the early Romans] came from the religious character of the law and from the belief imposed by the doctrine of augury, that the least inadvertence in the accomplishment of rites was sufficient to alienate the goodwill of the gods."

It seems probable, indeed, that legal procedure consisted in part of ceremonies originally devotional, by which the god Numa was

to be propitiated, and that the complex symbolic actions used were superposed. For of the judges, who "sat only on days fixed by the secret calendar of the pontiffs," it is said that "they did not admit the litigants to set forth simply the matters in dispute; mysterious formulæ, gestures, and actions were necessary." In further evidence of this priestly character of the judicial administration is the following statement of Professor W. A. Hunter:—

"Pomponius, in his brief account of the history of Roman Law, informs us that the custody of the XII Tables, the exclusive knowledge of the forms of procedure (*legis actiones*), and the right of interpreting the law, belonged to the College of Pontiffs."

And Mommsen tells us in other words the same thing.

But while we here see, as we saw in the cases of other early peoples, that the priest, intimately acquainted with the injunctions of the god, and able to get further intimations of his will, consequently became the fountain of law, and therefore the judge respecting breaches of law, we do not find evidence that in ancient Rome, any more than in Greece, Egypt, or Palestine, the advocate was of priestly origin. Contrariwise we find evidence that among these early civilized peoples, as at the present time among some peoples who have become civilized enough to have legal procedures, the advocate is of lay origin. Marsden says that in Sumatra—

"the plaintiff and defendant usually plead their own cause, but if circumstances render them unequal to it, they are allowed to *pinjam mulut* (borrow a mouth). Their advocate may be a *proattin*, or other person indifferently; nor is there any stated compensation for the assistance, though if the cause be gained, a gratuity is generally given."

So, too, from Parkyns we learn that the Abyssinians have a sort of lawyers—merely "an ordinary man with an extraordinary gift of the gab. These men are sometimes employed by the disputants in serious cases, but not invariably." Indeed, it must everywhere have happened in early stages when litigants usually stated their respective cases, that sometimes one or other of them asked a friend to state his case for him; and a spokesman who became noted for skill in doing this would be employed by others, and eventually a present to him would become a fee. It was thus among the Romans. After knowledge of the Twelve Tables had been diffused, and after the secrets of legal procedure had been disclosed by a secretary of Appius Claudius, there grew up a class of men, the *jurisconsulti*, learned in the law, who gave their advice, and also, later, advocates distinguished by their oratorical powers, who, as among ourselves, were furnished with materials and suggestions by lawyers of lower grade.

The superposing of civilizations and of religions throughout Northern Europe after Roman days, complicated the relations

between religion and law, and between those who administered them. Nevertheless, the evidence everywhere points to the conclusion we have already reached.

Beginning with heathen times there may be put first the facts which Sir George Dasent gives us respecting the ancient Norse. He writes:—

The priest "was the only civil, just as he was the only religious authority—minister and magistrate in one."

"In trials . . . it fell on him [the priest] to name the judges, and to superintend the proceedings."

But it seems that even in those rude days there had come into existence non-clerical advocates.

"There were the lawmen or lawyers (lögmenn), a class which we shall find still flourishing in the time of which our Saga tells. They were private persons, invested with no official character." "They seem to have been simply law-skilled men, 'counsel' to whom men in need of advice betook themselves."

In harmony with these statements are those made by an authority respecting Old-English institutions, Mr. Gomme. He says—

"We learn from the historians of Saxony that the 'Frey Feldgericht' of Corbey was, in pagan times, under the supremacy of the priests of the Eresburgh."

"There can be little doubt that the church or temple of primitive society was the self-same spot as the assembly-place of the people and the court of justice."

In support of this last conclusion it may be remarked that as in early times gatherings for worship afforded occasions for trading, so they also afforded occasions for legal settlements of disputes; and further that the use of the sacred edifice for this purpose (as among the Babylonians) was congruous with the conception, everywhere anciently entertained, that legal proceedings tacitly or avowedly invoked divine interposition—tacitly in the taking of an oath and avowedly in trial by judicial combat.

The conquest of northern heathenism by Christianity gradually led to subjugation of the heathen system of law by the system of law the Church imposed—partly its own, the canon law, and partly that inherited from Roman civilization, the civil law. The rules of conduct which, transmitted from the heathen priesthood, had become the common law, were in large measure overridden by the rules of conduct which the Christian priesthood either enacted or adopted. In early English days lay and clerical magnates co-operated in the local courts: laws derived from the old religion and from the new religion were jointly enforced.

"The clergy, in particular, as they then engrossed almost every other branch of learning, so (like their predecessors, the British Druids), they

were peculiarly remarkable for their proficiency in the study of the law. . . . The judges therefore were usually created out of the sacred order, as was likewise the case among the Normans; and all the inferior offices were supplied by the lower clergy, which has occasioned their successors to be denominated *clerks* to this day."

But with the growth of papal power a change began. As writes the author just quoted, Stephen—

"It soon became an established maxim in the papal system of policy, that all ecclesiastical persons, and all ecclesiastical causes, should be solely and entirely subject to ecclesiastical jurisdiction only."

After the conquest, when shoals of foreign clergy came over, and when they and the pre-existing monastic clergy were bribed by endowments to support the Conqueror, the papal policy prevailed so far as to separate the ecclesiastical court from the civil court; after which "the Saxon laws were soon overborne by the Norman justiciaries." In subsequent reigns, according to Hallam—

"the clergy combined its study [*i. e.*, the Roman law] with that of their own canons; it was a maxim that every canonist must be a civilian, and that no one could be a good civilian unless he were also a canonist."

Along with acceptance of the doctrine that the Christian high priest, the pope, was an oracle through whom God spoke, there was established in Christendom a theory of law like that held by ancient peoples: laws were divine *dicta* and priests divinely authorized interpreters of them. Under these circumstances the ecclesiastical courts extended their jurisdiction to secular causes; until, gradually, the secular courts were almost deprived of power: the removal of criminal clerics from secular jurisdiction and the penalty of excommunication on those who in any serious way opposed the clerical power, being of course efficient weapons. The condition of things then existing is well shown by the following statement of Prof. Maitland:—

"If we look back to Richard I.'s reign we may see, as the highest temporal court of the realm, a court chiefly composed of ecclesiastics, presided over by an archbishop, who is also Chief Justiciar; he will have at his side two or three bishops, two or three archdeacons, and but two or three laymen. The greatest judges even of Henry III.'s reign are ecclesiastics, though by this time it has become scandalous for a bishop to do much secular justice."

Not only were priests the judges and the interpreters of law, but they at one time discharged subordinate legal functions. In Germany, according to Stolzel, the notarial profession was in the hands of ecclesiastics. France, during the 13th century, furnished like evidence. Clerics played the parts of *procureurs* or attorneys, according to Fournier, who says:—

"les ecclésiastiques ne pouvait, en principe, accepter ces fonctions que pour réprésenter les pauvres, les églises, ou dans les causes spirituelles."

So, too, was it with the function of advocate. Sainte Palaye writes—

"Loisel . . . remarks that in the time of Philip [the Fair] and since, the best of them were 'ecclesiastical persons instructed in the Canon and Civil Law, learning practice chiefly by the decretals.'"

However, according to Fournier, this function was limited to certain cases—

"le prêtre ne peut exercer les fonctions d'avocat si ce n'est au profit de son Eglise et des pauvres, et sans recevoir de salaire."

But in England, when ecclesiastics had been forbidden by the pope to make their appearance in secular courts, it appears that they evaded the prohibition by disguising themselves.

"Sir H. Spelman conjectures (Glossar. 335), that coifs were introduced to hide the tonsure of such renegade clerks, as were still tempted to remain in the secular courts in the quality of advocates or judges, notwithstanding their prohibition by canon."

From which it would seem that the "renegade clerks" became barristers who personally received the profits of their advocacy.

By what steps the complete secularization of the legal class was effected in England, it does not here concern us to ascertain. It suffices to observe the state of things now arrived at.

So long have our judges ceased to display any clerical attributes, that now, to the ordinary citizen, the statement that they were once priests is surprising. If there remains any trace of the original condition of things, it is only in such a fact as that the Archbishop of Canterbury retains the power of conferring the degree of Doctor of Civil Law; which degree, however, is one covering only a restricted sphere of practice. But, while, save perhaps in observance of certain ceremonies and seasons, separation of judicial functionaries from clerical functionaries has long been complete, separation of certain areas of jurisdiction has taken place quite recently. Until some five and thirty years ago ecclesiastical courts still had jurisdiction over some secular matters—testamentary and matrimonial; but they were then deprived of this jurisdiction, and retained none save over affairs within the Church itself.

In conformity with the usual course of things, while the legal profession has been differentiating from the ecclesiastical, there have been going on differentiations within the legal profession itself. Originally, beyond the judge and the two suitors there occasionally existed only the advocate—a functionary who, becoming established, presently rendered his services to defendants as well as to plaintiffs. Gradually these ancillary agencies have complicated; until now there are various classes and sub-classes of those who conduct legal proceedings.

The original body of them has separated itself primarily into two great divisions — those directly concerned in carrying on causes in law-courts and those indirectly concerned who prepare the cases, collect evidence, summon witnesses, etc. Within the first of these classes has arisen a partial distinction between those whose business is mainly in courts and those whose business is mainly in chambers; and there are further segregations determined by the different courts in which the pleadings are carried on. To which add the cross-division of this class into Queen's Counsel or leaders, and ordinary barristers or juniors. Then in the accessory class—lawyers commonly so-called—we have the distinction, once well recognised, between attorneys and solicitors, arising from the separate divisions of jurisprudence with which they were concerned, but which has now lapsed. And we have various miscellaneous subdivisions partially established, as of those mainly concerned with litigious matter and those mainly concerned with non-litigious matter; of those who transact business directly and of those who act for others; those who are parliamentary agents; and so on.

In their general character, if not in their details, the facts now to be named will be anticipated by the reader. He will look for illustrations of the integrating tendency, and he will not be mistaken in so doing.

Very soon after the divergence of the legal class from the clerical class had commenced, there arose some union among members of the legal class. Thus we read that in France—

"En 1274, le concile de Lyon, dans quelques dispositions relatives aux procureurs, les met à peu près sur le même pied que les avocats. C'est que dès lors les procureurs forment une corporation qui se gouverne sous l'autorité des Juges d'Eglise."

In England also it appears that the two processes began almost simultaneously. When the deputies of the king in his judicial capacity ceased to be wholly nomadic, and fixed courts of justice were established at Westminster, the advocates, who were before dispersed about the kingdom, began to aggregate in London, where, as Stephen says, they "naturally fell into a kind of collegiate order." Hence resulted the Inns of Court, in which lectures were read and eventually degrees given: the keeping of terms being for a long time the only requirement, and the passing of an examination having but recently become a needful qualification for a call to the bar. Within this aggregate, constituting the collegiate body, we have minor divisions—the benchers who are its governors, the barristers, and the students. This process of incorporation began before the reign of Edward I; and while certain of the inns, devoted to that kind of law which has

now ceased to be marked off, have dwindled away, the others still form the centres of integration for the higher members of the legal profession.

Then we come to the lower members, who in early days became incorporated.

"It was ordained by stat. 4 Henry IV. c. 18, that all attornies should be examined by the justices, and by their discretions their names should be put in a roll: they were to be *good and virtuous*, and *of good fame*."

Other groupings of more modern and less coherent kinds have to be named. There is the Bar Committee, serving as an organ for the practising barristers; and there are the relatively vague unions of barristers who go the same circuits. For solicitors there is in London a central Law Society, along with which may be named Law Societies in leading provincial districts; and there are also various benevolent associations formed within these larger bodies.

Nor let us omit to notice how in this case, as in all cases, the process of integration has been accompanied by progress in definiteness. Early in its history the body of barristers separated itself by its regulations from the trading community; and then, more recently, it has increased its distinctness of demarcation by excluding those not adequately instructed. So too, with the body of solicitors. This has fenced itself round by certain regulations respecting admission, conduct, and practice, in such wise that by striking off the rolls those who have not conformed to the rules complete precision is given to the limits of the body.

And then, as serving to hold together these larger and smaller definitely consolidated aggregates, we have various periodicals—several weekly law-journals, and now also a law-quarterly.

A CURIOUS case of dual consciousness is recorded in the English journal Brain, by Dr. Lewis C. Bruce, late of the Derby Borough Lunatic Asylum. Deterioration is going on in the brain of the patient, but at different rates in the two lobes. Sometimes the right side alone acts; and then the patient talks Welsh, takes little interest in life, does not care for money or tobacco or for anything but his food, is left-handed, and is almost idiotic. When that side of the brain is inert and the left side is acting, the patient speaks chiefly English, is eager for money and tobacco, being even almost ready to steal them, and is right-handed. For a short interval between these two conditions, he mingles Welsh and English words, uses both hands, and is about halfway active. Of specimens of his handwriting in both stages, the Welsh can hardly be read and goes from right to left, while the English is legible, from left to right, and is generally normal. In either stage he seems to have no knowledge of what has passed in the other. The case seems to suggest that the two sides of the brain may have action independently of one another, and may be organs of communication with the external world of often very different degrees of power.

THE AIMS OF ANTHROPOLOGY.*

By DANIEL G. BRINTON.

A MODERN philosopher has advanced the maxim that what is first in thought is last in expression, illustrating it by the rules of grammar, which are present even in unwritten languages, whose speakers have no idea of syntax or parts of speech.

It may be that this is the reason why man, who has ever been the most important creature to himself in existence, has never seriously and to the best of his abilities made a study of his own nature, its wants and its weaknesses, and how best he could satisfy the one and amend the other.

The branch of human learning which undertakes to do this is one of the newest of the sciences; in fact, it has scarcely yet gained admission as a science at all, and is rather looked upon as a *dilettante* occupation, suited to persons of elegant leisure and retired old gentlemen, and without any very direct or visible practical applications or concern with the daily affairs of life.

It is with the intention of correcting this prevalent impression that I address you to-day. My endeavor will be to point out both the immediate and remote aims of the science of anthropology, and to illustrate by some examples the bearings they have, or surely soon will have, on the thoughts and acts of civilized communities and intelligent individuals.

It is well at the outset to say that I use the term anthropology in the sense in which it has been adopted by this association—that is, to include the study of the whole of man, his psychical as well as his physical nature, and the products of all his activities, whether in the past or in the present. By some writers, especially on the Continent of Europe, the term anthropology is restricted to what we call physical anthropology or somatology, a limitation of the generic term which we can not but deplore. Others again, and some of worthy note, would exclude from it the realm of history, confining it in time to the research of prehistoric epochs, and in extent, to the investigation of savage nations.

I can not too positively protest against such opinions. Thus "cabined, cribbed, confined," it could never soar to that lofty eminence whence it could survey the whole course of the life of the species, note the development of its inborn tendencies, and mark the lines along which it has been moving since the first

* Address of the retiring president of the American Association for the Advancement of Science, delivered at Springfield, Mass., August 29, 1895.

syllables of recorded time; for this, and nothing less than this, is the bold ambition toward which aspires this crowning bough of the tree of human knowledge.

You will readily understand from this the magnitude of the material which anthropology includes within its domain. First, it investigates the physical life of man in all its stages and in every direction. While he is still folded in the womb, it watches his embryonic progress through those lower forms, which seem the reminiscences of far-off stages of the evolution of the species, until the child is born into the world, endowed with the heritage transmitted from innumerable ancestors and already rich in personal experiences from its prenatal life. These combined decide the individual's race and strain, and potently incline, if they do not absolutely coerce, his tastes and ambitions, his fears and hopes, his failure or success.

On the differences thus brought about, and later nourished by the environment, biology, as applied to the human species, is based; and on them as expressed in aggregates, ethnography, the separation of the species into its subspecies and smaller groups, is founded. It has been observed that numerous and persistent although often slight differences arose in remote times, independently, on each of the great continental areas, sufficient to characterize with accuracy these subspecies. We therefore give to such the terms "races" or "varieties" of man.

All these are the physical traits of men. They are studied by the anatomist, the embryologist, the physician; and the closest attention to them is indispensable if we would attain a correct understanding of the creature man and his position in the chain of organic life.

But there is another vast field of study wholly apart from this and even more fruitful in revelations. It illustrates man's mental or psychical nature, his passions and instincts, his emotions and thoughts, his powers of ratiocination, volition, and expression. These are preserved and displayed subjectively in his governments and religions, his laws and his languages, his words and his writings, and, objectively, in his manufactures and structures, in the environment which he himself creates—in other words, in all that which we call the arts, be they "hooked to some useful end" or designed to give pleasure only.

It is not sufficient to study these as we find them in the present. We should learn little by such a procedure. What we are especially seeking is to discover their laws of growth, and this can only be done by tracing these outward expressions of the inward faculties step by step back to their incipiency. This leads us inevitably to that branch of learning which is known as archæology, "the study of ancient things," and more and more

to that part of archæology called prehistoric, for that concerns itself with the most ancient; and the most ancient is the simplest, and the simplest is the most transparent, and therefore the most instructive.

Prehistoric archæology is a new science. I can remember when neither its name nor its methods were known to the most learned anthropologists. But it has already taught us by incontrovertible arguments a wonderful truth—a truth opposing and reducing to naught many teachings of the sages and seers of past generations. They imagined that the primal man had fallen from some high estate; that he had forfeited by his own falseness, or been driven by some hard fate, from a pristine paradise, an Eden garden, an Arcadia; that his ancestors were demigods and heroes, himself their degenerate descendant.

How has prehistoric archæology reversed this picture? We know beyond cavil or question that the earliest was also the lowest man, the most ignorant, the most brutish, naked, homeless, half speechless. But the gloom surrounding this distant background of the race is relieved by rays of glory, for with knowledge not less positive are we assured that through all hither time, through seeming retrogressions and darkened epochs, the advance of the race in the main toward a condition better by every standard has been certain and steady, "ne'er known retiring ebb, but kept due on."

Archæology, however, is, after all, a dealing with dry bones, a series of inferences from inanimate objects. The color and the warmth of life it never has. How can we divine the real meaning of the fragments and ruins, the forgotten symbols and the perished gods, it shows us?

The means has been found, and this through a discovery little less than marvelous, the most pregnant of all that anthropology has yet offered, not yet appreciated even by the learned. This discovery is that of the physical unity of man, the parallelism of his development everywhere and in all time; any, more, the nigh absolute uniformity of his thoughts and actions, his aims and methods, when in the same degree of development, no matter where he is or in what epoch living. Scarcely anything but his geographical environment, using that term in its larger sense, seems to modify the monotonous sameness of his creations.

I shall refer more than once to this discovery, for its full recognition is the corner stone of true anthropology. In this connection I refer to it for its application to archæology. It teaches us this: That when we find a living nation of low culture we are safe in taking its modes of thought and feeling as analogous to those of extinct tribes whose remains show them to have been in about the same stage of culture.

This emphasizes the importance of a prolonged and profound investigation of the few savage tribes who still exist, for, although none of them is as rude or as brutelike as primitive man, they stand nearest to his condition, and, moreover, so rapid nowadays is the extension of culture that probably not one of them will remain untouched by its presence another score of years.

Another discovery, also very recent, has enabled us to throw light on the prehistoric or forgotten past. We have found that much of it, thought to be long since dead, is still alive and in our midst, under forms easily enough recognized when our attention is directed to them. This branch of anthropology is known as folklore. It investigates the stories, the superstitions, the beliefs, and customs which prevail among the unlettered, the isolated, and the young; for these are nothing less than survivals of the mythologies, the legal usages, and the sacred rites of earlier generations. It is surprising to observe how much of the past we have been able to reconstruct from this humble and long-neglected material.

From what I have already said, you will understand some of the aims of anthropology, those which I will call its "immediate" aims. They are embraced in the collection of accurate information about man and men, about the individual and the group, as they exist now and as they have existed at any and all times in the past, here where we are and on every continent and island of the globe.

We desire to know about a man his weight and his measure, the shape of his head, the color of his skin, and the curl of his hair; we would pry into all his secrets and his habits, discover his deficiencies and debilities, learn his language, and inquire about his politics and his religion—yes, probe those recesses of his body and his soul which he conceals from wife and brother. This we would do with every man and every woman, and, not content with the doing it, we would register all these facts in tables and columns, so that they should become perpetual records, to which we give the name "vital statistics."

The generations of the past escape such personal investigation, but not our pursuit. We rifle their graves, measure their skulls, and analyze their bones; we carry to our museums the utensils and weapons, the gods and jewels, which sad and loving hands laid beside them; we dig up the foundations of their houses and cart off the monuments which their proud kings set up. Nothing is sacred to us; and yet nothing to us is vile or worthless. The broken potsherd, with half-gnawed bone, cast on the refuse heap, conveys a message to us more pregnant with meaning, more indicative of what the people were, than the boastful inscription which their king caused to be engraved on royal marble.

This gleaning and gathering, this collecting and storing of facts about man from all quarters of the world and all epochs of his existence, is the first and indispensable aim of anthropologic science. It is pressing and urgent beyond all other aims at this period of its existence as a science, for here more than elsewhere we feel the force of the Hippocratic warning that the time is short and the opportunity fleeting. Every day there perish priceless relics of the past, every year the languages, the habits, and the modes of thought of the surviving tribes which represent the earlier condition of the whole species are increasingly transformed and lost through the extension of civilization. It devolves on the scholars of this generation to be up and doing in these fields of research, for those of the next will find many a chance lost forever of which we can avail ourselves.

And here let me insert a few much-needed words of counsel on this portion of my theme. Why is it that even in scientific circles so little attention is paid to the proper training of observers and collectors in anthropology?

We erect stately museums, we purchase costly specimens, we send out expensive expeditions; but where are the universities, the institutions of higher education, that train young men how to observe, how to explore and collect in this branch? As an eminent ethnologist has remarked, in any other department of science—in that, for instance, which deals with flowers or with butterflies—no institution would dream of sending a collector into the field who lacked all preliminary training in the line or knowledge of it; but in anthropology the opinion seems universal that such preparation is quite needless. Carlyle used to say that every man feels himself competent to be a gentleman farmer or a crown prince; our institutions seem to think that every man is competent to be an anthropologist and archæologist; and let a plausible explorer present himself, the last question put to him will be whether he has any fitness for the job.

Hence our museums are crammed with doubtful specimens, vaguely located, and our volumes of travel with incomplete or wholly incorrect statements, worse than purely fictitious ones, because we know them to be the fruit of honest intentions, and therefore give them credit.

But you will naturally ask, To what end this accumulating and collecting, this filling of museums with the art products of savages and the ghastly contents of charnel houses? Why write down their stupid stories and make notes of their obscene rites? When it shall be done, or as good as done, what use can be made of them beyond satisfying a profitless curiosity?

This leads me to explain another branch of anthropology to which I have not yet alluded—one which introduces us to other

aims of this science quite distinct from those I have mentioned. That branch is ethnology.

Ethnology in its true sense represents the application of the principles of inductive philosophy to the products of man's faculties. You are aware that that philosophy proceeds from observed facts alone; it discards all preconceived opinions concerning these facts; it renounces all allegiance to dogma, or doctrine, or intuition; in short, to every form of statement that is not capable of verification. Its method of procedure is by comparison—that is, by the logical equations of similarity and diversity, of identity and difference; and on these it bases those generalizations which range the isolated fact under the general law, of which it is at once the exponent and the proof.

By such comparisons ethnology aims to define in clear terms the influence which the geographical and other environment exercises on the individual, the social group, and the race; and, conversely, how much in each remains unaltered by the external forces, and what residual elements are left, defiant of surroundings, wholly personal, purely human. Thus, rising to wider and wider circles of observation and generalization, it will be able at last to offer a conclusive and exhaustive connotation of what man is—a necessary preliminary, mark you, to that other question, so often and so ignorantly answered in the past, as to what he should be.

Ethnology, however, does not and should not concern itself with this latter inquiry. Its own field is broad enough and the harvest offered is rich enough. Its materials are drawn from the whole of history and from pre-history. Those writers who limit its scope to the explanation of the phenomena of primitive social life only have so done because these phenomena are simpler in such conditions, not that the methods of ethnology are applicable only to such. On the contrary, they are not merely suitable, they are necessary to all the facts of history, if we would learn their true meaning and import. The time will come, and that soon, when sound historians will adopt as their guide the principles and methods of ethnologic science, because by these alone can they assign to the isolated fact its right place in the vast structure of human development.

In the past, histories have told of little but of kings and their wars; some writers of recent date have remembered that there is such a thing as the people, and have essayed to present its humble annals; but how few have even attempted to avail themselves of the myriad of sidelights which ethnology can throw on the motives and the manners of a people, its impulses and acquisitions!

It is the constant aim of ethnology to present its results free

from bias. It deprecates alike enthusiasm and antipathy. Like Spinoza's god, *nullum amat, nullum odit.* Its aim is to compare dispassionately all the acts and arts of man, his philosophies and religions, his social schemes and personal plans, weighing and analyzing them, separating the local and temporal in them from the permanent and general, explaining the former by the conditions of time and place, referring the latter to the category of qualities which make up the oneness of humanity, the solid ground on which he who hereafter builds "will build for aye."

This, then, briefly stated, is the aim of that department of anthropology which we call ethnology. In yet fewer words, its mission is "to define the universal in humanity," as distinguished from all those traits which are the products of fluctuating environments.

This universal, however, is to be discovered, not assumed. The fatal flaw in the arguments of most philosophers is that they frame a theory of what man is and what are the laws of his growth, and pile up proofs of these, neglecting the counter-evidence, and passing in silence what contradicts their hypotheses.

Take, for instance, the doctrine of evolution as applied to man. It is not only a doctrine but a dogma with many scientists. They look with theological ire on any one who questions it. I have already said that in the long run and the general average it has been true of man. But that we have any certainty that it will continue true is a mistake; or that it has been true of the vast majority of individuals or ethnic groups is another mistake. As the basis for a boastful and confident optimism it is as shaky as sand. Taken at its real value, as the provisional and partial result of our observations, it is a useful guide; but swallowed with unquestioning faith as a final law of the universe, it is not a whit more inspiring than the narrowest dogma of religious bigotry.

We have no right, indeed, to assume that there is anything universal in humanity until we have proved it. But this has been done. Its demonstration is the last and greatest conquest of ethnology, and it is so complete as to be bewildering. It has been brought about by the careful study of what are called "ethnographic parallels"—that is, similarities or identities of laws, games, customs, myths, arts, etc., in primitive tribes located far asunder on the earth's surface. Able students, such as Bastian, Andree, Post, Steinmetz, and others have collected so many of these parallels, often of seemingly the most artificial and capricious character, extending into such minute and apparently accidental details from tribes almost antipodal to each other on the globe, that Dr. Post does not hesitate to say: "Such results leave no room for

doubt that the psychical faculties of the individual as soon as they reach outward expression fall under the control of natural laws as fixed as those of inorganic nature."

As the endless variety of arts and events in the culture history of different tribes in different places, or of the same tribe at different epochs, illustrates the variables in anthropologic science, so these independent parallelisms prove beyond cavil the ever-present constant in the problem—to wit, the one and unvarying psychical nature of man, guided by the same reason, swept by the same storms of passion and emotion, directed by the same will toward the same goals, availing itself of the same means when they are within reach, finding its pleasure in the same actions, lulling its fears with the same sedatives.

The anthropologist of to-day who, like a late distinguished scholar among ourselves, would claim that because the rather complex social system of the Iroquois had a close parallel among the Munda tribes of the Punjab, therefore the ancestors of each must have come from a common culture center; or who, like an eminent living English ethnologist, sees a proof of Asiatic relations in American culture because the Aztec game of *patolli* is like the East Indian game of *parchesi*—such an ethnologist, I say, may have contributed ably to his science in the past, but he does not know where it stands to-day. Its true position on this crucial question is thus tersely and admirably stated by Dr. Steinmetz: "The various customs, institutions, thoughts, etc., of different peoples are to be regarded either as the expressions of the different stadia of culture of our common humanity or as different reactions of that common humanity under varying conditions and circumstances. The one does not exclude the other. Therefore the concordance of two peoples in a custom, etc., should be explained by borrowing or by derivation from a common source only when there are special known and controlling reasons indicating this; and when these are absent, the explanation should be either because the two peoples are on the same plane of culture or because their surroundings are similar."

This is true not only of the articles intended for use, to supply the necessities of existence, as weapons and huts and boats—we might anticipate that they would be something similar, otherwise they would not serve the purpose everywhere in view; but the analogies are, if anything, still more close and striking when we come to compare pure products of the fancy, creations of the imagination or the emotions, such as stories, myths, and motives of decorative art.

It has proved very difficult for the comparative mythologist or the folklorist of the old school to learn that the same stories—for instance, of the four rivers of Paradise, the flood, the ark, and

the patriarch who is saved in it—arose independently in western Asia, in Mexico, and in South America, as well as in many intervening places, alike even in details, and yet neither borrowed one from the other nor yet drawn from a common source. But until he understands this he has not caught up with the progress of ethnologic science.

So it is also with the motives of primitive art, be they symbolic or merely decorative. How many volumes have been written tracing the migrations and connections of nations by the distribution of some art motive, say the *svastika*, the *meander*, or the cross! And how little of value is left in all such speculations by the rigid analysis of primitive arts that we see in such works as Dr. Grosse's Anfänge der Kunst, or Dr. Haddon's attractive monograph on the Decorative Art of British New Guinea, published last year! The latter sums up in these few and decisive words the result of such researches pursued on strictly inductive lines: "The same processes operate on the art of decoration, whatever the subject, wherever the country, whenever the age." This is equally true of the myth and the folk tale, of the symbol and the legend, of the religious ritual and the musical scale.

I have even attempted, I hope not rashly, to show that there are quite a number of important words, in languages nowise related by origin and contact, which are phonetically the same or similar, not of the mimetic class, but arising from certain common relations of the physiological function of language; and I have urged that words of this class should not be accounted of value in studying the affiliations of language.

And I have also endeavored to demonstrate that the sacredness which we observe attached to certain numbers, and the same numbers, in so many mythologies and customs the world over, is neither fortuitous nor borrowed the one from the other, but depends on fixed relations which the human body bears to its surroundings, and the human mind to the laws of its own activity; and therefore that all such coincidences and their consequences —and it is surprising how far-reaching these are—do not belong to the similarities which reveal contact, but only to those which testify to psychical unity.

So numerous and so amazing have these examples of culture identities become of late years that they have led more than one student of ethnology into a denial of the freedom of the human will under any of the definitions of voluntary action. But the aims of ethnology are not so aspiring. It is strictly a natural science, dealing with outward things—to wit, the expressions of man's psychical life, endeavoring to ascertain the conditions of their appearance and disappearance, the organic laws of their birth, growth, and decay. These laws must undoubtedly be cor-

related with certain mental traits, but it is not the business of the ethnologist to pursue them to their last analysis in the realm of metaphysics. For instance, we may trace all forms of punishment back to the individual's passion for revenge, or we may analyze all systems of religion until we find the common source of all to be man's dread of the unknown, and these will be sufficient ethnologic explanations of both these phenomena, but not a final analysis of the emotion of dread or the thirst for vengeance. Ethnology declines to enter these realms of abstraction.

I repeat that to define "the universal in humanity" is the aim of ethnology—that is, the universal soul or psyche of humanity.

But let me not be understood as speaking of this as of some entity, like the *ame humaine* of the Comtists. That were sophistical word-mongering in the style of ancient scholasticism. There is no such entity as humanity, or race, or people, or nation. There is nothing but the individual man or woman, the "single, separate person," as Walt Whitman says. Hence some of the most advanced ethnologists are ready to give up the *ethnos* itself as a subject of study. Those terms so popular a few years ago, *Völkerpsychologie, Völkergedanken,* racial psychology, ethnic sentiments, and the like, are looked upon with distrust. The external proofs of the psychical unity of the whole species have multiplied so abundantly that some maintain strenuously that it is not ethnic or racial peculiarities, but solely external conditions on the one hand and individual faculties on the other, which are the factors of culture evolution.

While I admit that this question is still *sub judice,* I add that the position just stated seems to be erroneous. All members of the species have common human mental traits; that goes without saying; and in addition it seems to me that each of the great races, each ethnic group, has its own added special powers and special limitations compared with the others; and that these ethnic and racial psychic peculiarities attached to all or nearly all members of the group are tremendously potent in deciding the result of its struggle for existence.

I must still deny that all races are equally endowed, or that the position with reference to civilization which the various ethnic groups hold to-day is one merely of opportunity and externalities. I must still claim that the definition of the *ethnos* is one of the chief aims of ethnology; and that the terms of this definition are not satisfied by geographic explanations. Let me, with utmost brevity, name a few other connotations, prepotent, I believe, in the future fate of nations and races.

None, I maintain, can escape the mental correlations of its physical structure. The black, the brown, and the red races differ anatomically so much from the white, especially in their splanch-

nic organs, that even with equal cerebral capacity they never could rival its results by equal efforts.

Again, there is in some stocks and some smaller ethnic groups a peculiar mental temperament, which has become hereditary and general, of a nature to disqualify them for the atmosphere of modern enlightenment. Dr. Von Buschan has recently pointed out this as distinctly and racially pathologic; an inborn morbid tendency, constitutionally recreant to the codes of civilization, and therefore technically criminal.

Once more, one can not but acknowledge that the relations of the emotional to the intellectual nature vary considerably and permanently in different ethnic groups. Nothing is more incorrect than the statement so often repeated by physicians that the modern civilized man has a more sensitive emotional system than the savage. The reverse is the case. Since the dark ages, Europe has not witnessed epidemic neuroses so violent as those still prevalent among rude tribes.

These and a number of similar traits separate races and peoples from each other by well-marked idiosyncrasies, extending to the vast majority of their members and pregnant with power for weal or woe on their present fortunes and ultimate destinies. The patient and thorough investigations of these peculiarities is therefore one of the most apposite aims of modern ethnology.

In this sense we can speak of the *Volksgeist* and *Völkergedanken*, a racial mind, or the temperament of a people, with as much propriety and accuracy as we can of any of the physical traits which distinguish it from other peoples or races.

For the branch of anthropology which has for its field the investigation of these general mental traits the Germans have proposed the name "Characterology" (*Karakterologie*). Its aim is to examine the collective mental conditions and expressions of ethnic groups, and to point out where they differ from other groups and from humanity at large; also to find through what causes these peculiarities came about, the genetic laws of their appearance, and the consequences to which they have given rise.

This branch of anthropology is that which offers a positive basis for legislation, politics, and education as applied to a given ethnic group; and it is only through its careful study and application that the best results of these can be attained, and not by the indiscriminate enforcement of general prescriptions, as has hitherto been the custom of governments.

The development of humanity as a whole has arisen from the differences of its component social parts, its races, nations, tribes. Their specific peculiarities have brought about the struggles which in the main have resulted in an advance. These peculiarities, as ascertained by objective investigation, supply the only

sure foundation for legislation; not *a priori* notions of the rights of man, nor abstract theories of what should constitute a perfect state, as was the fashion with the older philosophies and still is with the modern social reformers. The aim of the anthropologist in this practical field is to ascertain in all their details, such as religions, language, social life, notions of right and wrong, etc., wherein lie the idiosyncrasies of a given group, and frame its laws accordingly.

Perhaps what I have said sufficiently explains the aims of ethnology. Some one has pertinently called it "the natural science of social life," because its methods are strictly those of the natural sciences, and its material is supplied by man living in society.

The final arbiter, however, to whom it appeals is, I repeat, not the *ethnos*, not the social group, but the individual. I think it was Goethe who, nearly a century ago, uttered the pithy remark, "Man makes genera and species; Nature makes only individuals." Hence the justification of any result claimed by ethnology must come from the psychology of the individual; in his personal feelings and thoughts will be discovered the final and only complete explanation of the forms of sociology and the events of history. As I have elsewhere urged, man himself, the individual man, is the only final measure of his own activities, in whatever direction they are directed.

On the other hand, the only rational psychology—using that term as a science of the mental processes—must be the outcome of anthropology conducted as a natural science. For thousands of years other plans have been pursued. The philosopher would delve in his "inner consciousness"; the theologian would turn to his revelation; the historian would reason on his undigested facts; but the psychologist of the future, taking nothing for granted, will define the mentality of the race by analyzing each of its lines of action back to the individual feelings which gave them rise.

It is quite likely that some who have heard me thus far, and have agreed with me, are still dissatisfied. On their lips is that question which is so often put to, and which so often puzzles, the student of the sciences, *cui bono*? What practical worth have these analyses and generalizations which have been referred to?

Fortunately, the anthropologist is not puzzled. His science, like others, has its abstract side, seemingly remote from the interests of the workaday world; but it is also and pre-eminently an applied science—one the practicality and immediate pertinence of which to daily affairs render it utilitarian in the highest degree.

Applied anthropology has for its aims to bring to bear on the improvement of the species, regarded on the one hand as groups, and on the other as individuals, the results obtained by ethnography, ethnology, and psychology.

Such an improvement is broadly referred to as an increased or higher civilization; and it is the avowed aim of applied anthropology accurately to ascertain what are the criteria of civilization, what individual or social elements have in the past contributed most to it, how these can be continued and strengthened, and what new forces, if any, may be called in to hasten the progress. Certainly no aims could be more immediately practical than these.

Here, again, anthropology sharply opposes its methods to those of the ideologists, the dogmatists, and the deductive philosophers. It refuses to ask, What *should* improve man? but asks only, What *has* improved him in the past? and it is extremely cautious in its decision as to what "improvement" really means. It certainly does not accept the definition which up to the present the philosophies and theologies have offered any more than it accepts the means by which these claim that our present civilization has been brought about.

This department of anthropology is still in its infancy. We are only beginning to appreciate that, in the future, political economy, like history, will have to be rearranged on lines which this new science dictates. The lessons of the past, their meaning clearly apprehended, will be acknowledged as the sole guides for the future. It may be true, as De Tocqueville said of the United States, that a new world needs a new political science; but the only sure foundation for the new will be the old.

Applied anthropology clearly recognizes that the improvement of humanity depends primarily on the correct adjustment of the group to the individual; and, as in ethnology, its ultimate reference is not to the group, but to the individual. In the words of John Stuart Mill, the first to apply inductive science to social evolution, it is that the individual may become "happier, nobler, wiser," that all social systems have any value.

We may profitably recall what the same profound thinker and logician tells us have been up to the present time the prime movers in human social progress. They are: First, property and its protection; second, knowledge and the opportunity to use it; and third, co-operation, or the application of knowledge and property to the benefit of the many.

But Mill was altogether too acute an observer not to perceive that while these *momenta* have proved powerful stimulants to the group, they have often reacted injuriously on the individual, developing that morbid and remorseless egotism which is so prevalent in modern civilized communities. Nor should I omit to add that the remedy which he urged and believed adequate for this dangerous symptom is one which every anthropologist and every scientist will fully indorse—the general inculcation of the love of truth, scientific, verifiable truth.

It seems clear, therefore, that the teachings of anthropology, whether theoretical or practical, lead us back to the individual as the point of departure and also the goal. The state was made for him, not he for the state; any improvement in the group must start by the improvement of its individual members. This may seem a truism, but how constantly is it overlooked in the most modern legislation and schemes of social amelioration! How many even of such a learned audience as this have carefully considered in what respects the individual man has improved since the beginning of historic time? Is he taller, stronger, more beautiful? Are his senses more acute, his love purer, his memory more retentive, his will firmer, his reason stronger? Can you answer me these questions correctly? I doubt it much. Yet if you can not, what right have you to say that there is any improvement at all?

To be sure there is less physical suffering, less pain. War and famine and bitter cold are not the sleuthhounds that they once were. The dungeons and flames of brutal laws and bigoted religions have mostly passed away. Life is on the average longer, its days of sickness fewer, justice is more within reach, mercy is more bountifully dispensed, the tender eye of pity is ever unscarfed.

But under what difficulties have these results been secured! What floods of tears and blood, what long wails of woe, sound down the centuries of the past, poured forth by humanity in its desperate struggle for a better life—a struggle which was blind, unconscious of its aims, unknowing of the means by which they should be obtained, groping in darkness for the track leading it knew not whither!

Ignorant of his past, ignorant of his real needs, ignorant of himself, man has blundered and stumbled up the thorny path of progress for tens of thousands of years. Mighty states, millions of individuals, have been hurled to destruction in the perilous ascent, mistaking the way, pursuing false paths, following blind guides.

Now anthropology steps in, the new Science of Man, offering the knowledge of what he has been and is, the young but wise teacher, revealing the future by the unwavering light of the past, offering itself as man's trusty mentor and friend, ready to conduct him by sure steps upward and onward to the highest summit which his nature is capable of attaining; and who dares set a limit to that?

This is the final aim of anthropology, the lofty ambition which the student of this science deliberately sets before himself. Who will point to a worthier or a nobler one?

RECENT RECRUDESCENCE OF SUPERSTITION.

By Prof. E. P. EVANS.

[*Concluded.*]

AN article published in the Popular Science Monthly for December, 1892, and entitled Modern Instances of Demoniacal Possession, gives an account of the casting out of a devil from a boy named Michael Zilk, by Father Aurelian, a Capuchin monk, in Wemding, Bavaria. The exorcist accused a Protestant woman, Frau Herz, of having conjured the devil into the boy and denounced her as a witch, and was prosecuted by the woman's husband for defamation. The trial, which took place in November, 1892, resulted in the condemnation of the defendant, who was sentenced to pay a fine of fifty marks, with costs, and, in default of payment, to five days' imprisonment. The case derives its chief interest from the testimony of two ecclesiastical experts, whom Father Aurelian called in for the purpose of proving that he had acted strictly in accordance with the rules and regulations of the Catholic Church. These experts were Dr. J. E. Prunner, provost of the cathedral in Eichstadt, and the cathedral capitular, Dr. Schneidt, both of whom approved of Father Aurelian's method of proceeding. That men may enter into a league with Satan, says Dr. Prunner, is affirmed by Holy Writ and by canon law; both the truth of Scripture and the teachings of the Church establish the possibility and actuality of demoniacal possession beyond a peradventure, which must therefore be accepted as incontestable. As regards Michael Zilk, Father Aurelian was perfectly justified in assuming that he was possessed with a devil, since all the signs favored this presumption, such as sudden paroxysms, abnormal bodily strength, hagiophobia, or strange dread of holy things, and demoniac ecstasy. The demon becomes firmly established in the organism and uses it as a base of operations, causing the individual to curse and rage and foam, using his tongue to speak languages unknown to him, and endowing his muscles with preternatural force. When these manifestations convinced Father Aurelian that the devil was to pay, it was his duty to investigate the matter and to ascertain the *causa possessionis*, and whether it was produced by *ars magica* or witchcraft. "*Maleficium* always presupposes *factum cum dæmone*"; in other words, sorcery implies a compact with Satan. In the course which he pursued, Father Aurelian followed the instructions and obeyed the injunctions of the ritual, even to the assumption that the dried pears given by Frau Herz to the boy had been the means of conveying the demoniac infection, since the ritual expressly enjoins

upon the exorcist to pay heed to what the energumen has eaten. He was also right in believing what the devil said on this point, for "if the devil is the father of lies, he can nevertheless be compelled by the Church to tell the truth; that he was forced in this case to bow to ecclesiastical authority, is proved by the result."

Dr. Schneidt indorsed the opinion of his colleague, adding a few remarks from a "philosophical-psychological" point of view and denouncing the scientific materialism of the day, which denies the existence of spirits and their influence on corporeal substances. He admitted that the symptoms of Saint Vitus's dance and hysteria are very similar to those of demoniacal possession, but can be readily distinguished by two tests, both of which were applied by Father Aurelian: the boy Zilk raged and fumed when sprinkled with holy water, but remained quiet if ordinary water was used; the utterance of a benediction in ecclesiastical Latin rendered him extremely violent, whereas he was wholly unaffected by the recitation of a passage from a Latin classic. Dr. Schneidt thought Father Aurelian was right in laying great stress upon these two criteria, and in regarding the manner of their "reaction" as conclusive proof of diabolic agency.

That learned doctors of theology and high Church dignitaries should be willing to appear before a court of justice at the present day with such expert testimony as this, is a curious psychological phenomenon and a remarkable instance of superstitious survival. It would also be a greater miracle than any wrought by the holy coat of Trier, if the inculcation and dissemination of these mediæval notions by the bishops and other clergy should not produce a benighting and degrading effect upon the masses intrusted to their instruction and guidance in spiritual things. A few examples may be cited to show to what extent the popular belief in witchcraft, demoniacal possession, and the efficacy of conjurations still prevails. In the spring of 1894 a Hungarian named Jordan started on a bicycle from Bucharest, with the intention of making a tour through the Balkan peninsula to Constantinople. Not far from Philipoppel, in Roumelia, he was overtaken by night and obliged to stop at a hovel which served as a public house, and after confiding his "wheel" to the care of the innkeeper, who took charge of it with considerable distrust, went to bed. Very soon the news spread abroad that a sorcerer had arrived riding on a magic car drawn by invisible spirits, and a crowd of excited peasants filled the inn under the direction of the pope, or village priest, who sprinkled the bicycle with holy water and adjured the demon to depart. The "magic car" of the itinerant sorcerer was then taken out of doors and demolished. On the next morning, when Mr. Jordan wished to continue his journey, he found

his bicycle broken to pieces, and was under the necessity of walking a long distance to the nearest railway station. It was only the fear of his enchantments as a wandering magician that saved him from personal harm.

In October, 1894, a chromolithograph of St. Anna, in a church at Naples, showed suddenly on the breast of the saint a white spot, which in the eyes of her worshipers gradually grew into the form of a lily. The rumor of this wonder caused thousands of people to flock to the sacred shrine, and several miracles were already reported, when the police ordered the print to be taken down and examined. On investigation, the white lily proved to be mold. It is hardly credible that the Neapolitan clergy should not have known the nature of this phenomenon, and yet they did nothing to expose the delusion, but made capital out of it by holding solemn services at the altar in recognition of its supposed miraculous character.

The results of such superstitious notions are not always so harmless as in the cases just cited. Thus, a peasant living at Pontea Ema, about a mile from Florence, in Tuscany, had a daughter who was subject to severe hysterical convulsions; she had also "suffered many things of many physicians," and was thereby "nothing bettered, but rather grew worse"—a result which will not surprise any one who knows what a wretched quacksalver the country doctor is in Italy. The parish priest intimated that the girl was probably possessed with a devil, and one day in February, 1893, the peasant and his daughter, after hearing several masses suitable to the occasion, went to Florence to consult a wise woman famous for sorceries, who informed him that an ordinary conjuration would cost five lire, and might not be effective, whereas the invocation of Beelzebub, which would cost twenty-five lire, would be an infallible remedy. The peasant paid the twenty-five lire and the old witch began her conjurations, dragging herself over the floor on her knees and howling fearfully. Finally she ceased, and declared that the conjuration had been successful. "Now go home," she added, "and heat the oven. The first person who comes to your door will be the one who has caused your daughter's malady; thrust this person into the oven in the presence of your daughter, and there will be no recurrence of the disease." The peasant obeyed these instructions and kept the oven heated all night. Early the next morning there was a rap at the door. "*Chi è?*" (Who's there?) asked the peasant. "For heaven's sake, a piece of bread!" was the reply. The peasant rushed to the door, seized the beggar woman as she stood there pale with hunger and shivering with cold, and without a moment's hesitation put her into the heated oven. Two milkmen passing by heard her cries, and, breaking open the bolted door of

the house, rescued her, already half-suffocated, from a horrible death.

About a year ago an old woman named Theresia Kleitsch was crucified at Rekeseley, in Hungary, on suspicion of having bewitched the stalls of her neighbors and thus caused many cattle to die of murrain. Not long since, in a village near Moscow, a woman seventy-three years of age, named Darya, was clubbed and stoned to death by the inhabitants because she was supposed to have an "evil eye," which brought sickness and other misfortunes upon her neighbors. Seven of the chief culprits were sentenced to four years' hard labor in Siberia. When brought to trial they pleaded not guilty, declaring that the old hag was well known to be a witch, and that they were perfectly justified in not suffering her to live.

The measures recently devised to suppress a witch at Lupest, in Hungary, are the more noteworthy because they emanated from the civil authorities. The death of an old woman who had the reputation of being in solemn covenant with the devil was the occasion of public rejoicings. In the midst of the festivities it was announced that a villager's cow had died suddenly and under suspicious circumstances. The common council, after an official investigation, reported that the cow had been bewitched by the deceased beldame, and, in order to prevent her from doing further harm, commanded that a stallion should be brought and made to leap over her grave. The horse, however, showed signs of fright and refused to jump, and this circumstance greatly added to the public excitement. Finally, it was decreed by the common council that the body of the witch should be exhumed and stabbed with red-hot pitchforks. This proceeding proved effective, and the old hag ceased to trouble her former neighbors.

In the little town of Gif, about twelve miles from Paris, was a girl nineteen years of age, who had suffered for several months from an aggravated form of hysteria accompanied by catalepsy. One of the most distinguished Parisian physicians, Dr. Dumontpallier, made a diagnosis of the disease, declared it to be curable, and offered to treat it gratuitously if the parents would send the patient to one of the city hospitals. This generous offer was declined, owing to the intervention of the village priest, who had meanwhile informed the family that it was a clear case of demoniacal possession, with which the Church alone was competent to cope, and had applied to Monseigneur Goux, Bishop of Versailles, for permission to proceed with the exorcism. The right reverend ecclesiastic not only granted this request, but also sent the director of the theological seminary of Versailles to assist him in the conjuration. Both appeared at the bedside of the maiden in full canonicals, each with a crucifix in his hand and

attended by their acolytes, and went through with the benedictions, adjurations, and aspersions prescribed by the ritual. No sooner did the girl perceive them than she cried out, "There come the parsons with their hocus-pocus!" and as they recited the litany, instead of responding with *ora pro nobis*, she used the word said to have been uttered by Cambroche at the battle of Waterloo when the Old Guard was summoned to surrender, repeating it three times in an angry tone. This conduct only confirmed the exorcists in their theory of diabolism. Indeed, one young priest recognized the different devils by their accent in speaking, and made a long list of their names: Satan, Lucifer, Beelzebub, Mammon, etc. Thus encouraged, the conjurers continued their efforts with unabated zeal, and finally succeeded, according to their own statement, in casting out all the large demons, and had only twenty-eight lesser demons to expel, when the bishop of Versailles, in view of the scandal which the discussion of the affair by the press threatened to bring on the Church, recalled the director of the seminary, and put an end to the ceremony which he had himself authorized. What became of the residue of devilkins that remained in possession of the maiden we are not informed.

About the same time, in the spring of 1893, in the French hamlet of Cras-Culot, the parents of a small boy who had fallen ill and was assumed to have been bewitched, enticed into their house a woman suspected of having caused the trouble and commanded her to exorcise the victim of her sorceries. On her protesting that she knew nothing of such arts, the parents of the child and their assembled friends began to beat the supposed witch and to stick hairpins into her neck and shoulders, and one of the fanatical crowd expressed his regret that it was no longer possible to burn her publicly at the stake. Perhaps a private *auto da fé* would have been held had she not succeeded finally in escaping and claiming the protection of the police court, which sentenced her principal persecutors each to fourteen days imprisonment and a fine of twenty-six francs.

In June, 1891, a Viennese waitress named Fanny Strobl brought a suit for slander against Maria Wirzar, a servant girl, who had sent the plaintiff several postal cards, addressing her as "cannibal, witch, night hag," and accusing her of coming down the chimney in the dark and sucking all the blood out of her (Maria Wirzar's) veins until she was reduced to skin and bone. The curiosity of the judge was excited, and he requested the defendant to state more clearly what she meant. "Well," she replied, "such a night hag comes over a person when asleep like a current of air, benumbing and stupefying him. If the sleeper is able to rouse himself and cry out 'Jesus! Mary! Joseph!' then the witch de-

sists and departs. This woman (pointing to the plaintiff) is such a night hag. She drives me out of every place, so that I can never stay anywhere more than three weeks. At midnight she comes out from under my bed when I am asleep, sits on me, and sucks the blood out of my breast. I am so weak that I can not work. Formerly I was strong and healthy, now I am lank and lean, because she has drained me of all my blood." Thereupon a woman in the court room exclaimed: "That is true; the witch ought to let her alone. I myself have seen the red spot on her breast and the bites on her arm with the marks of real teeth." The case was then adjourned in order to obtain the opinion of a physician as to the mental condition of the defendant. But if the psychiater declares Maria Wirzar to be crazy, what should he say of the sanity of priests like Dr. Bischofberger, or of the Catholic bishops and other ecclesiastical dignitaries whose teachings are directly responsible for the spread of such gross popular delusions?

Still later, in the autumn of 1892, Victoria Seifritz was charged with having bewitched the stall of the burgomaster of Schapbach, in Baden, and thereby produced an epidemic of hoof disease. As the circulation of this report was injurious to her reputation, and she found it inconvenient to prosecute the burgomaster, with whom it appears to have originated, she published a notice in the local newspaper denying that she ever possessed or exercised any power as a witch. In December of the same year a maid-servant, Elizabeth Hörrath, of Obermichelbach, in Bavaria, was sentenced to ten days' imprisonment for having accused her aunt of being a house witch and her own mother of being a stall witch, asserting that she saw the latter riding on the back of a cow, which immediately afterward went dry. The remarkable thing was, not that an ignorant and malevolent girl should have started such a report, but that many of the neighbors should have believed it and broken off all intercourse with the two satellites of Satan.

In June, 1885, at Kempten, in Bavaria, Xaver Endtes, a professional wizard, was tried and condemned to jail for three weeks because he swindled a peasant named Ostheimer out of seventeen marks under the pretext of casting devils out of cattle. He kindled a fire in the stable and heated two iron bars red hot, then poured on them a quantity of milk, and persuaded Ostheimer that the film of scalded milk that remained was the skin of the witch, who had thus been burned and rendered harmless for the future.

In 1891 a witch conjurer (Hexenbanner), a mason by trade, was arrested by the police at Ulm, where he had established himself as an exorcist, charging twenty-five marks for his services and finding apparently plenty of customers. He was also sentenced to three weeks' imprisonment as a common swindler. The possibility of brazen-faced deceptions of this sort implies a general

prevalence of gross superstition in the communities where they are practiced. The first and strongest impulse of the European peasant even in the most enlightened countries is to ascribe all extraordinary good or evil fortune to diabolical agencies. If a man's hens lay more eggs, or his cows give more milk, or his fields yield better crops than those of his neighbors, the latter are pretty sure to attribute his prosperity to witchcraft. Pliny records a case of this kind in which the freedman C. Furius Cresinus was summoned to appear before the ædile Spurius Albinus on the charge of sorcery, because he raised richer harvests on his small farm than others did on their large estates. In his defense he pointed to his well-fed slaves, his superior agricultural implements, and his fat oxen, and exclaimed: "These, O Quirites, are some of my magic arts; but my night-waking and continuous toil I can not show you here on the forum!" Curiously enough, in the early part of the last century precisely the same accusation was brought against a woman who cultivated her own land at Bischofswerder, in west Prussia; and again in November, 1893, at Dresden, a shoemaker named Liebscher instituted a suit against a miner and small innkeeper named Timmel to recover damages for defamation of a like character. Both parties lived in the village of Müdisdorf, not far from Freiberg. It seems that Liebscher's hens and cows supplied him abundantly with eggs and milk, whereas Timmel's were remarkably unproductive. Liebscher was then charged with practicing sorcery, and thereby transferring the eggs and milk from Timmel's poultry and kine to his own. As this report was diligently circulated by the defendant and believed by the great majority of the inhabitants of Müdisdorf and of the surrounding country, it naturally proved to be very injurious to the reputation and the business of the shoemaker, who appears to have been a man of intelligence far superior to that of his neighbors. The testimony taken at the trial revealed the startling fact that nine tenths of the population of this mining district, although good Protestants, hold firmly to the belief in witchcraft and the reality of satanic compacts.

In the summer of 1874 a woman named Frenzel, living at Trulben, in the Bavarian palatinate, consulted a famous wizard at Ixheim, near Zweibrücken, in order to ascertain who had bewitched her child that he should have fallen sick. The wizard placed a key in an open Bible and told Frau Frenzel to lay her finger on it and then to repeat the names of all the people in Trulben. No sooner had she mentioned Margaret Klein than the key turned over. "That is the witch," exclaimed the wizard, who also learned through the movements of the key that she had acquired her knowledge of the magic art from her grandmother, and had the power of transforming herself into a cat or dog at

pleasure. When the mother returned home and was washing her child she heard the melancholy mewing of a cat near the house, and was now thoroughly convinced of the truth of the wizard's statements. Margaret Klein, an estimable maiden of twenty-two, was on this account decried and shunned by nearly every person in the village, and was finally compelled, for the sake of her good name, to prosecute Frau Frenzel, who was sent to jail for five days and condemned to pay the costs of the trial.

It is hardly necessary to multiply instances of this kind. They are of constant occurrence and endlessly repetitious, the tautological echo of old superstition, a striking illustration of the persistency of tradition and the poverty of the popular imagination. The question as to when the last witch was burned has been frequently discussed by historians, who differ as to the exact date, but generally agree that it was not later than the second half of the eighteenth century. As a matter of fact, a woman named Agrafena Ignatyeva was burned as a witch by her fellow-countrymen at Vratshevo, in the Russian province of Novgorod, in 1879, if not with the co-operation at least with the collusion of the local authorities, and we have no reason to suppose that she was or will be the last victim of this cruel delusion.

The unpleasant smell of garlic which so often offends the nostrils of travelers in Servia and other countries of eastern and southern Europe is due in a great measure to the notion that witches have a strong aversion to this plant. It is chiefly for this reason that the common people not only eat it, but also rub themselves and their children with it, especially on going to bed, so as not to be visited by any wandering night hag who might otherwise strike the sleeper on his breast with her magic wand, open his side, and devour his heart; the wound would then close up without leaving any scar to show the cause of his death.

In some districts of Dalmatia it is still customary to throw all the women into the water on a specified day to see whether they will sink or swim. A rope is attached to each one in order to save from drowning those who prove their innocence by sinking. The witches who float are also pulled out, and after being rather roughly handled are made to promise to renounce the devil on pain of being stoned. The Dalmatians are evidently of Heine's opinion, that

> "Genau bei Weibern
> Weiss man nicht wo der Engel
> Aufhört und der Teufel anfängt."

Hence they deem it necessary to apply their simple but decisive test occasionally, and the prevalence of an epidemic or epizoöty is pretty sure to be followed by a general immersion of the fairer and frailer sex.

In August, 1893, at Montelepre, in Sicily, a girl of seventeen suffered from a painful malady which her family and kinsmen suspected of being the result of demoniacal possession. This opinion was confirmed by the village *strega* or witch, who gave them full information concerning the name, character, origin, and power of the indwelling demon, and recommended the fifteenth of the month, the Feast of the Assumption of the Virgin, as the fittest time for casting out the evil spirit. On the appointed day the witch prepared a bath of boiling-hot water, into which she threw snail shells, lobsters' claws, nettles, and similar ingredients of a powerful hell-broth, recalling the contents of the caldron over which the three weird sisters in Macbeth muttered their potent charm. The patient was then put into the water and covered with a bed blanket, under which a pound and a half of burning incense was placed. The screams and struggles of the unfortunate girl were of no avail, and not until she fainted away was she taken out in a parboiled condition and laid on a bed, where she soon afterward expired. As she was at the last gasp the witch said, "Now the charm is beginning to work and the demon is about to go out of her."

It is not merely among ignorant and superstitious Sicilians that such things are possible. Not many years ago a young man at Urschütz, near Rosenberg, in Upper Silesia, was treated by a "wise woman" in precisely the same manner and with equally fatal results.

It was recently reported from Catania, in Sicily, that a fiddler named Carmolo had killed twenty-four children and saturated the earth with their blood as a means of finding hidden treasure. A little later the bodies of twenty children were discovered in the woods near the hamlets of Cibali and Santa Sofia; at the same time the parents received anonymous letters, in which the writer told them not to grieve for the dead, since their blood would enable him to unearth an immense amount of money, which he would share with them and thus amply compensate them for their loss.

In March, 1894, a farm laborer, Sier, was sentenced to fourteen months' imprisonment for having exhumed the body of a newly buried child in the graveyard at Moosbach, in Bavaria, and taken out one of its eyes, which, he believed, would render him invisible, like the tarn-helmet of the old German saga, and thus make it possible for him to thieve with impunity. The notion that a bridge will remain firm for all time if a living human being is immured in its foundations is quite prevalent in eastern Europe, and the gypsies are generally suspected of stealing children and selling them for this purpose. Not long since, when a bridge was to be built over the Save, near Breczka, in

Bosnia, the whole population, Christian and Mohammedan, rose up in arms against a band of gypsies who were camping in the neighborhood, and would have put them to death had it not been for the energetic intervention of the authorities. The excitement was caused by a rumor that negotiations were going on between the bridge builders and this vagabond folk for the purchase of a child. There is a popular tradition that a bridal pair were walled up in the old Roman bridge over the Narenta at Mostar, and that the structure owes its strength to this sacrifice. A fresh human liver, especially that of a woman, is supposed to confer magical powers upon him who eats it; and it is highly probable that the desire to become a great magician may explain the many mysterious murders and horrible mutilations of women which have occurred within the past few years, such as the otherwise incomprehensible exploits of Jack the Ripper in London, and similar hideous deeds near Innsbrück, in the Tyrol, and elsewhere. A like exhibition of superstition was recently witnessed in Barcelona at the execution of six anarchists, when old women dipped their handkerchiefs in the blood that flowed from the coffins, making the sign of the cross three times and holding the dirty clouts to their noses. Such a blood-stained cloth is prized as a powerful talisman and carefully preserved.

In some districts on the Rhine the belief that midwives may be in league with the devil and substitute an imp for the newborn infant is not uncommon. Such changelings are called *Kielkröpfe*, and this term would imply that their fiendish origin is indicated by a wen on the throat. It is well known that Luther was firmly convinced of the reality of these substitutions, and urged the Prince of Anhalt to have every hellish succubus or succuba drowned at once; but the sovereign, whose theological education on this point seems to have been neglected, could not be fully persuaded of the existence of such creatures and declined to act upon the reformer's advice.

During the reign of Frederick the Great the statue of a madonna in the Catholic church of a Prussian town was robbed of a costly ornament. A soldier, whose frequent and fervent devotions at this shrine had been remarked, was arrested, and the jewels were found in his possession. He was accordingly tried for church robbery and sacrilege and condemned to be shot. The sentence of the court-martial was submitted to the king for approval, together with the culprit's protest that he had not stolen the precious stones, but that while he was engaged in prayer and laying his necessities before the seat of mercy, the Virgin took the ornament from her neck and gave it to him. One can imagine the malicious pleasure with which the cynical and skeptical monarch referred the whole matter to the Catholic bishop,

requesting him to give his official opinion as to the possibility of such a miracle. The bishop was in a quandary. He knew that the soldier's statement was false and absurd, but he could not say so without contradicting the teachings and traditions of the Church and impeaching the testimony of the saints and all the records of hagiology. In his report he was therefore compelled to admit that the prayer may have been answered in the manner described. On the strength of this "expert evidence" Frederick annulled the sentence of the court-martial, but forbade the soldier on penalty of death to offer henceforth petitions of this kind to any image of the Virgin.

One of the most characteristic as well as anachronistic exhibitions of religious folly and frenzy in our day is the *Springprocession*, or procession of jumpers, which takes place yearly at Echternach, in Luxemburg, on the first Tuesday after Whitsunday, and is popularly regarded as a sure cure for epilepsy, St. Vitus's dance, syntexis, murrain, and other maladies of men and cattle. A full description of this performance was given in a book published more than twenty years ago and entitled Die Springprocession und die Wallfahrt zum Grabe des heiligen Willibrord in Echternach (Luxemburg, Brück, 1871), the author of which, J. B. Krier, a priest and religious instructor in the Echternach preparatory school, expresses his firm belief in its therapeutic efficacy and general wonder-working power. "We can not but envy these people," he says, "on account of their living faith, and in our inmost soul praise God, who in our cold and indifferent age has kept alive such a fire in the hearts of our fellowmen." A few Catholics of superior culture, like Prof. Froschammer, of Munich, vigorously protested against the glorification of such crass fanaticism, but it received the approval and encouragement of the episcopate, and, instead of disappearing in the light of the nineteenth century, as one would expect such a survival of mediævalism to do, has been growing stronger ever since. On May 15, 1894, 16,905 persons, including one bishop, 140 clergy, 267 musicians, 2,213 prayers, 2,448 singers, and 11,836 springers, took part in the strange ceremony. This number, which has been derived from official documents, is the largest on record, and furnishes a drastic illustration of the manner in which the patronage of the Church contributes to the promotion of superstition.

The "springprocession" is, in fact, one of the queerest sights that have been witnessed in Christendom since the Flagellants of the thirteenth century made the streets of Italian cities hideous with their scourgings and howlings. The men, women, and children who are to join in the choral dance—which an ancient Greek or Roman, if he should rise from the dead, might easily mistake for a Bacchanalian orgy—assemble on a meadow near the town,

where they are arranged in rows or groups, the schoolboys and schoolgirls being in charge of their respective teachers, as if they were going on a picnic. At a given signal the musicians strike up the lively tune known as "Willibrord's Dance," and the saltatory movement begins, the whole mass moving three or four steps forward and one or two steps backward, or four steps to the right and the same number to the left in a diagonal direction, thus advancing, as it were, on the hypothenuse instead of on the perpendicular of a triangle. From a distance, the bobbing and swaying throng resembles the swell and fall of a restless sea, or the bubbling of boiling water in an immense caldron. In this manner the procession moves on for more than two hours through the streets of the town and up the sixty-two steps leading to the parish church, where the dance is kept up for some time around the tomb of St. Willibrord. The dancers join hands, or more frequently hold together by means of a handkerchief, for the sake of greater freedom of motion. Here and there an old man may be seen dragging along an infirm son, who makes desperate attempts to leap with the rest, or a stout woman gasping and sweating under the heavy burden of a paralytic daughter, whom she bears in her arms as she bounds to and fro.

Many legends are afloat concerning the origin of this custom. Thus it is said that in the latter half of the eighth century a sort of epizoötic chorea broke out in the region round about Echternach, and caused all the horses, cows, sheep, and goats to dance in their stalls and to refuse to eat. As no medicine gave relief, the people made a vow that they would dance round the grave of St. Willibrord, and no sooner was this vow fulfilled than the plague ceased, apparently in accordance with the homœopathic principle—*saltus saltibus curantur*. Another tradition connects it with the pestilence known as the black death, which prevailed about the middle of the fourteenth century. In all probability, however, it is a survival of the old pagan feast which was celebrated at the summer solstice in honor of the sun, and changed by Willibrord into a Christian festival. This policy of adopting heathen observances that could not be easily abolished was urged by Pope Gregory the Great as early as the sixth century, in his famous letter to the Benedictine Augustine, first Bishop of Canterbury, and followed by Boniface, Willibrord, and all the other Anglo-Saxon missionaries to the German tribes. It was due to this prudent spirit of compromise that the feast of Ostara, the German goddess of spring, was transformed into Easter, and the nativity of John the Baptist, the herald of the Sun of Righteousness, was placed on June 24th, so as to correspond with the pagan festivities of midsummer.

In Italy the belief in the baneful power of "the evil eye," or

jettatura, is almost universal among the peasants and common people, and quite prevalent even among the higher and more cultivated classes. Pope Pius IX was generally supposed to be a *jettatore,* and many good Catholics, while kneeling before him for his benediction, were wont slyly to extend toward him their hands doubled into a fist, with the thumb thrust between the index and middle finger as a means of warding off the malign influence. Giovanni Maria Mastai-Ferretti was born with this uncanny gift, and neither his consecration to the priesthood nor his elevation to the papacy sufficed to eradicate it or to suspend its operation. The benignity of aspect which distinguished this kind-hearted successor of St. Peter might conceal, but could not counteract, the fatal fascination that lurked in his "evil eye."

In Germany, it is only in the Tyrol that this superstition appears to prevail, although sporadic cases of it occur in Thuringia, where the witchcraft delusion still has a strong hold on the rural population. The village of Espenfeld, for example, numbers two hundred inhabitants, of whom one half are firmly convinced that the other half are skilled in sorcery; of the latter, several are supposed to have grown rich by paying out money and then conjuring it back into their own coffers. A peasant, who imagined that he had lost considerable money in this way, was advised by a "wise woman" to put the coin thus received into a glass jar and then seal it up. He did so, and soon afterward the coins began to hop and skip as if they wished to get out, but, finding it impossible to escape, gradually grew quiet. By taking this precaution he circumvented the conjurer and saved his money.

In England, men or kine that are supposed to suffer from the witchery of the evil eye are said to be "overlooked." "If a murrain afflicts a farmer's cattle," says the author of a recently published work on this subject (The Evil Eye, by Frederick T. Elworthy; London, Murray, 1895), "he goes off secretly to the 'white witch'—that is, the old witch finder—to ascertain who has 'overlooked his things,' and to learn the best antidote. Only the other day a farmer in North Devon, whose cattle were dying of anthrax, applied, not to a first-class veterinary surgeon, but to a 'white witch,' for a remedy against the pestilence, and as a consequence lost almost his whole herd." The same writer states that a pig's or sheep's heart stuck full of pins is found in many chimneys in old farmhouses as a reprisal against witches. It was believed that the witch, who had "overlooked" the animal and caused its death, would have her own heart pricked and pierced by the pins thrust into the heart of her victim, which had been "ill wisht" by her. This sort of retribution, based upon the principle of sympathy, plays a prominent part in the annals of witchcraft. The Somerset peasant says: "Nif you do meet wi' anybody

wi' a north eye, spat dree times." Pliny speaks of spitting in the bosom as a means of inducing the gods to grant any presumptuous desire (*veniam quoque a deis spei alicujus audacioris petimus, in sinum spuendo*), and Juvenal refers to the custom of bespitting the upper folds of the toga (*conspuere sinus*) in order to avert divine wrath provoked by haughtiness of speech; and if we go back nearly four centuries earlier to the Greek poet Theocritus, we find that the remedy prescribed by the English boor for warding off the influence of the evil eye was employed by the rustics of that ancient time for precisely the same purpose. The sixth idyl of this pastoral poet consists of a dialogue between two herdsmen, Daphnis and Demoitas, of whom the latter, in the course of conversation, remarks: "Lest I should be enchanted by the evil eye, I spit three times into my breast" (*ὡς μὴ βασκανθῶ δέ τρὶς εἰς ἐμὸν ἔπτυσα κόλπον*), and adds that in doing so he had followed the advice of an old wizard.

An ornament in the shape of a crescent moon (*σεληνίς* or *σεληνίσκος*) was worn by the Greeks or placed on the walls of their houses as a *προβασκάνιον* or preservative against the evil eye, and the *lulunæ*, with which Roman women adorned their persons, were also regarded as safeguards against witchcraft. We have a survival of this superstition in the half moons so often seen on harness and occasionally on buildings. Indeed, in Oriental countries all jewels are amulets, and are prized more for their occult virtue than for their superficial beauty. The Romans hung a *fascinum* in the form of a phallus round the necks of children as a preventive against witchcraft, and the pieces of red coral used by our teething infants to facilitate dentition are a reminiscence of this usage connected with the Priapian cult. The *Drudenfuss*, or pentagram (*), which the Tyrolese draws on the threshold of his stable to protect his cattle against enchantment, is a relic of Pythagorean mysticism and mediæval magic.

A dreadful tale of cruelty caused by the witchcraft delusion comes to us from the Emerald Isle. A few months ago, at Ballyvadlea, in the county of Tipperary, a woman named Bridget Cleary had an attack of influenza or grippe, which, as is usually the case with maladies of men and beasts, was ascribed to demoniac influences. Her husband, a cooper by trade, got the notion into his head that she had been "overlooked," and thereby spirited away by a wicked fairy, who had taken possession of her body. He called a family council, consisting of her father, an aunt, four cousins, a couple of neighbors, and the village simplist, who unanimously confirmed his suspicion, and went to work to exorcise and expel the evil spirit, so that the unfortunate woman might return to herself and her friends. The simplist prepared a disgusting decoction, which her husband poured down her throat,

exclaiming, "There, take that, thou witch!" He then put this question to her twice: "Art thou Mary Boland, the wife of Michael Cleary? Speak by the Lord!" She replied: "I am Mary Boland, the daughter of Pat Boland, by the Holy Ghost!" It now occurred to one of the neighbors, named Dunin, that if they should put her on the fire, which fairies are notoriously much afraid of, the indwelling spirit would speak the truth, and probably be compelled also to depart. This clever suggestion was at once acted upon. The sick woman was taken out of her bed and held over the flames, while in the midst of her fearful screams her tormentors kept shouting, "Come home, Bridget Boland, come home!" She was again put to bed, and Cleary, who had become greatly excited, continued to cry out, "In the name of God, art thou Bridget Cleary, my wife?" declaring that, if she did not give a satisfactory answer three times, he would burn her up. As she was too exhausted to heed this threat, he threw the petroleum lamp at her and she was soon all ablaze, and, in the words of an eyewitness, "burned like a torch." No voice of compassion responded to her shrieks, which only provoked the harsh command of her husband: "Be still! Troth, I'm not burning Bridget; in a minute, begorrah, you'll see the witch going up the chimney." The charred body was put into a sack and thrown out of the window. There it was found and borne to the graveyard by the constables of the village, but no member of the family of the deceased attended her funeral. They were all scattered about on the neighboring hills, each armed with a sharp knife and awaiting the appearance of Bridget Cleary mounted on a white horse which the fairies had given her. There they watched day and night, firmly believing that if they could only succeed in cutting the reins of the bridle the spell would be broken and the unfortunate woman disenchanted. Instead of the magic steed, they were met by a body of policemen and taken to Dublin, where they are to be tried for murder.

In Ireland the laws against witchcraft were not abolished until 1821; and as the Catholic Church still prescribes formulas and performs rites for the exorcism and expulsion of evil spirits, it is no wonder that the delusion lingers in the minds of the people, and sometimes gives rise to horrible cruelty like that ignorantly inflicted upon Bridget Cleary.

About thirty years ago printed prayers addressed to "the true stature of Jesus," which had been supernaturally revealed to some ecstatic soul, were extensively sold in Bavaria as talismans to prevent and destroy diseases. But superstition, too, is not wholly free from the whims of fashion, and these prayers have now been superseded by another panacea called "Lourdes waffle," a thin

piece of pastry in the form of a madonna made of flour and the water of Lourdes by the Order of Redemptorists at Cortona, in Tuscany. Quantities of these new-baked fetiches are manufactured and exported every year with the approval of His Holiness Leo XIII, by whom they are especially commended as a specific for demoniacal infestations.

In 1887, when the phenomena of hypnotism began to excite general interest and to be discussed by the press, La Civittá Cattolica, the official organ of the Vatican, published an article ascribing these strange manifestations to diabolical agencies, and asserting them to be desperate attempts of Satan to recover the sovereignty of this world, which the Church is gradually wresting from his grasp.

Unfortunately for the progress of knowledge and the general diffusion of enlightenment, this explanation of hypnotism is a fair example and illustration of the attitude of the papacy toward every puzzling problem which presents itself to the human mind for investigation. There is only one solution: the devil is to pay. The same opinion is held and taught by the Greek Church, as well as by conservative Lutheranism and many other rigidly orthodox sects of Protestantism. Luther asserted that "if a man loses an eye or hand, falls into the fire and is burned to death, or into the water and is drowned, mounts a ladder and breaks his neck, tumbles down without knowing why or how, or incurs daily unforeseen accidents, all these things are mere tricks and onsets of the devil" (*eitel Teufelswürf' und Schläg*'). If a big bluebottle buzzed about in his study and happened to light on his pen, he was sure that it was an emissary of Satan endeavoring to hinder him in his work. Even the refined and scholarly Melanchthon relates similar experiences: "When I was in Tübingen," he says, "I saw every night flames which burned a long time and then vanished in a dense cloud of smoke. Likewise in Heidelberg, forms like falling stars appeared to me every night. They were undoubtedly devils, which are constantly roving about among men." This belief in the omnipresence of satanic satellites, embodied in animate and inanimate objects, was easily confirmed by the citation and frequent perversion of scriptural texts. Thus the words of the Psalmist, "Set a watch, O Lord, before my mouth: keep the doors of my lips," was interpreted, not as entreaty to be saved from the sin of evil-speaking, but as a prayer for protection against evil spirits, who might take advantage of the act of oscitation to enter into and get possession of the human body. It was formerly believed that the devil drowzed people and thus incited them to yawn for this express purpose; hence the custom, once generally prevalent and still practiced in Spain and Italy, of making the sign of the cross over the mouth in

yawning, of which the habit of covering the mouth with the hand when yawning is said to be a survival.

Delusions growing out of the dread of demons die hard, especially when it is in the supposed interest of sacerdotalism to uphold them. Every invasion of the realm of supernaturalism through the progress of science is feared and resented by ecclesiastical organizations, lest it should prove to be an entering wedge destined to destroy the foundations upon which they rest. It is this apprehension that often leads men as a body to sustain and perpetuate beliefs which as individuals they know to be false, boldly asserting and often honestly believing that the overthrow of their own little system of faith would imperil the whole edifice of religion and society, although the existence of such solidarity is shown by all the teachings of history to be utterly illusive. Hierarchical and official Christianity to-day bears about the same relation to contemporary scientific and philosophic culture that paganism did to the best thoughts of the period when Lucretius wrote his didactic poem De Rerum Natura, or when Lucian, more than two centuries later, composed his satirical dialogues.

The Tyrolese Jesuit Tanner had brought himself into grave suspicion by advising inquisitors to proceed with caution in the prosecution and punishment of witches; and when he died, in 1632, he was denied Christian burial, because there was found in his possession a dangerous hairy devil, which, on closer examination, proved to be a flea under a magnifying glass. The Church, however, obstinately refused to recognize its error, and still holds to the legend of the "dangerous hairy devil." Recantation is fatal to the prestige of infallible authority, which is forced by its pretensions to cling to its decisions, however absurd, and to close its mind to all sources of enlightenment. It is in this necessity that the divergence of scientific from theological conceptions of the universe originates and gradually widens into an impassable gulf. A divinely inspired and therefore inerrable record can adapt itself to the progress of human thought only by forced interpretations and positive perversions of its original meaning. Hence the supreme importance which all systems of religion attach to hermeneutics, the science of sciences, as Origen called it, absolutely essential to the evolution of doctrinal theology. It was Samuel Werenfels who said of the Bible:

> "Hic liber est, in quo quisque sua dogmata quærit,
> Invenit et pariter dogmata quisque sua."

The same idea is expressed by Rückert in Die Weisheit des Brahmanen:

> "Des Glaubens Bilder sind unendlich umzudeuten;
> Das macht so brauchbar sie bei so verschiednen Leuten."

This sort of exegetical jugglery, with its allegorical, anagogical, and tropological methods of exposition, is not confined to the Jewish and Christian Scriptures, but extends to the sacred books of all nations. Veda, Avesta, Tripitaka, Taò-tĕ-King, Koziki, Kur'an, Adi Granth, Kurral, and Popol Vuh have all been put to the rack by hermeneutical inquisitors and made to confess whatever doctrines their tormentors wished them to teach. We have a striking illustration of this tendency in recent attempts to deprive the Hebrew cosmogony of its true character as the terse and highly poetical version of an ancient Assyrian creation myth, in order to bring it into harmony with the modern theory of evolution.

The same fatality compels the Church in the nineteenth century to observe the forms of propitiation, incantation, and conjuration which were the natural outgrowth and consistent expression of primitive demonolatry, but are utterly repugnant to all rational conceptions of the constitution of the universe and of the laws that govern it. Some years ago the writer was the guest of a Catholic priest in a remote region of the Tyrol. The house was a massive building of the tenth century, formerly used as a cloister, and still adorned with portraits of the old abbots and distinguished monks who were once its inmates. Attached to it was a spacious chapel which now served as the parish church. One day as a severe storm was gathering the church bells began to ring violently in order to affright and drive away the devils who were supposed to be riding on the tempest as satellites of the "prince of the power of the air," and hurling thunderbolts against the habitations of men. The priest admitted that the custom was a relic of pagan superstition and of no efficacy whatever, denied the demonic origin of meteorological phenomena, and added that the ringing of many large bells, like the firing of cannon, would rather tend to produce storms by agitating the air than to disperse them. "But if I should act according to my own judgment and neglect this time-honored practice," he continued, "I should be held morally responsible for all damage done by lightning within the precincts of my parish." He placed his own person and property under the protection of a lightning-rod, but was constrained by his ecclesiastical affiliations to pander to mediæval tradition, and cause the mountain valley to resound with the devil-defeating clangor of consecrated bells.

In November, 1894, it was reported that a statue of the Virgin Mary at Reggio, in Calabria, had been seen opening her mouth and moving her lips, and this absurd rumor attracted thousands of persons, who came to present offerings and to prostrate themselves before the wonderful image, praying to be delivered from the perils of earthquake and similar calamities. It is not surpris-

ing that the ignorant and credulous peasantry of southern Italy should fall into gross fetichism of this sort; the astonishing thing is that the priests of a Church which sends missionaries to Africa should encourage such crass superstition at home, and, instead of seeking to enlighten the minds of the masses, should march in procession to the scene of the supposed miracle with banners and censers, singing hymns and chanting litanies, and displaying all the pomp and paraphernalia of an imposing religious ritual in confirmation of a vulgar delusion.

In August, 1894, the population of one of the suburbs of Vienna was thrown into intense excitement by the rumored apparition of the Virgin Mary, who was said to have been seen at sundry times sitting on the branch of a tree in an old cemetery and holding the child in her arms. The throng became so great as to require the intervention of a squadron of police in order to prevent a complete interruption of the city traffic. Not only was the reality of the supernatural appearance generally believed, but several persons turned it to practical account by noting the exact time of the occurrence, hour, day, month, and year, so as to secure lucky numbers for the lottery, and even attributed the presence of the police to the anxiety of the Austrian Minister of Finance lest, by a happy combination of these numbers, some one should win a tern and thus deplete the state treasury. A workman from a neighboring factory, who chanced to pass by, endeavored to demonstrate the impossibility of such phenomena, and urged the crowd not to give credence to idle tales of this sort; but this laborer was the only one who acted the part of Paul on Mar's Hill, and reproved the multitude for being "too superstitious." Not a representative of the clergy, from the humblest ecclesiastic to the highest dignitary of the Church, has ever been known to improve occasions of this kind for the religious instruction and intellectual elevation of the people. Indeed, it would be difficult for them to do so, in view of the fact that the literature which the Catholic Church still publishes and disseminates for the promotion of piety consists chiefly of similar legends; and it would not surprise us if a full and authentic account of the Vienna apparition should appear in the columns of the Innsbrück periodical, Monthly Roses to the Honor of the Immaculate Mary, Mother of God, as an incentive to more ardent adoration of the Virgin.

Some years ago, in the month of May, I was walking up the Ludwigstrasse, in Munich, with a German friend well known as a genial poet and earnest Catholic. Just then a procession of maidens dressed in white, with wreaths of flowers on their heads and an image of the Virgin borne aloft, came out of the church and passed through the garden, in which are the stations with Fortner's frescoes representing the life and passion of Christ.

"There is something that appeals to the imagination," remarked the German. "And purely a creation of the imagination, too," was my reply. A conversation ensued, from which it appeared that my friend regarded all religious beliefs, institutions, rites, and ceremonies solely from an æsthetic and poetic point of view. He even declared that it made no difference to him whether such a person as Christ ever lived, and whether the popes were the successors of Peter or not; he should still be a Christian and a Catholic. He admitted that all sacred literatures are more or less mythical, and that our Holy Writ forms no exception to the rule. With the progress of the race the old myths are refined and transformed, both artistically and ethically, and thus adapted to every advance in civilization, but they never die out. "The masses," he added, "are mentally and morally mere children and will probably always remain so, and the most interesting and instructive books for children are *märchen*." Here was a scholarly and thoughtful man who stood wholly out of reach of "the higher criticism," since he was ready to assent to its most radical conclusions without the slightest change in his attitude to the current system of belief.

A mind thus constituted would regret the decay of superstition as a decline of ideality and a limitation of the undefined and unknown regions of the supernatural, in which that errant sprite, the imagination, is free to expatiate and quick to discover wonders more strange than any invented by the Moor of Venice to win the heart of Senator Brabantio's daughter. We fully appreciate the poetical side of popular mythology and the unfading fascination of folklore, and feel the charm that lingers in customs growing out of these survivals of primitive beliefs; but this is another phase of the subject which can not be discussed in the present paper. There are many tourists who remember Rome as it was under papal rule, with its countless beggars and chronic filth and perennial sources of malarial fever, and are fain to lament the disappearance of these picturesque features through the purification and regeneration of the ancient city. It is the same sort of false sentiment that mourns over what the poet calls

"The fair humanities of old religion,"

the loss of which has been more than made good by the marvelous discoveries of modern science, whose achievements rival the annals of credulity in their appeals to the imagination, and render the visible and invisible forces of Nature, once the terror of man, now tributary to his happiness.

EVOLUTION IN FOLKLORE.

SOME WEST AFRICAN PROTOTYPES OF THE "UNCLE REMUS" STORIES.

By the late Colonel A. B. ELLIS.

IN the process of collecting the folklore of West Africa, but chiefly that of the Gold Coast, I have found several tales which are evidently the West African variants of some of the stories collected in the Southern States by Mr. Joel Chandler Harris, and published under the title of "Uncle Remus," and a comparison of the two sets may be of some interest to American readers, besides affording an example of the extent to which folklore is affected by change of environment.

The rôle of Brer Rabbit is filled on the Gold Coast by the Spider (*Anansi*), and on the Slave Coast by the Tortoise (*Awon*), who is doubtless the prototype of the Terrapin in "Uncle Remus." In both districts the Hare figures in the tales, and possibly Brer Rabbit is the Hare amid new surroundings, but in West Africa "Long Ears" rather takes the place of Brer Fox, as he is usually outwitted by the Spider and the Tortoise.

So large a number of the folklore tales of the Gold Coast have the Spider for their hero that the title *Anansi' sem*, "Spider stories," is now the generic native name for all folklore tales whatever, no matter what the subject may be; and this designation survives in the British West Indies in the name "Nancy stories," which is there applied by the negro to his local folklore. The supply of slaves for the British West Indies was drawn almost exclusively from the Gold Coast, so that all, or almost all, of the existing folklore of those islands is derived direct from the Spider stories, and can be readily traced; but in the Southern States the connection is not always so apparent, for although up to the beginning of the present century Gold Coast negroes formed the bulk of the imported slaves, yet, after about 1810, when the African kingdom of Yoruba broke up, large numbers of Slave Coast negroes were introduced, with the result that the local tales present features peculiar to both districts of West Africa.

The second tale in Mr. Harris's "Uncle Remus" series is entitled The Wonderful Tar-baby, and, briefly, is as follows: Brer Fox makes an effigy of tar, mixed with turpentine, and sets it up by the roadside. Brer Rabbit, coming along the road, sees the tar-baby and bids it "Good morning." The tar-baby makes no reply, upon which Brer Rabbit grows angry and strikes it, with the result that his hand sticks to the effigy. Then he strikes with

his other hand, with the same result; then he kicks with his feet, and, finally, butts with his head, until he is completely fixed to the tar-baby. As will be readily seen, this is evidently a variant of the following Gold Coast tale:

SPIDER AND THE FARMER.

There was a famine in Spider's country, and Spider had nothing to eat. Now Spider had a son, named Kwaku Tyom, and Spider's son used to go to a farm not far away and steal cassava. And every day when he brought home the cassava, his father would ask him, "Where dost thou get this cassava?" But Spider's son always made answer that he could not tell him, for if he, Spider, were to go there, some harm might befall him. Spider said, "Oh! my son, did I not beget thee, and yet thou thinkest thyself to be more clever than I? Show me the place, and I will be careful that no one sees me." But Spider's son still refused to show Spider.

Now, whenever Spider's son went to the farm to dig cassava, he used to carry a bag, which he filled with cassava, and so brought home; and Spider played his son Kwaku Tyom a trick, for, when night fell, and Spider's son had laid himself down and was sleeping, Spider put wood ashes into the bag and made a hole in the bottom thereof.

Next morning Spider's son arose, and slung the bag around his neck, and set forth to go to the farm; and as he walked, the ashes fell through the hole in the bag and marked the path. Then Spider came after his son and saw the road, but he did not go to the farm that day; he returned home and said nothing. In the evening Spider's son returned home and brought cassava.

Next morning Spider arose early and followed the track of the ashes to go to the farm; and when he reached the place he saw a something there made of crossed sticks, standing in the midst of the farm, and there were snail shells hanging thereon, which the breeze rattled.*

When Spider saw this he was afraid. He saluted the something, and said, "Good morning, sir"; but the something made him no answer. Then Spider became vexed, and he said, "Oh! oh! dost thou want to shake me by the hand before thou answerest me?" He put out his hand to the something, and his hand became fixed to the sticks so that he could not draw it back.

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* What we should call a scarecrow, but on the Gold Coast such things scare people rather than birds, for they are meant to protect crops from thieves, and are believed to possess a latent power, derived from some god, to entrap or bring misfortune upon any one who interferes with what is under their guardianship. The snail shells here mentioned are those of the large edible snail of West Africa.

Then Spider became more vexed, and said, "What sort of manners are these? I was so polite as to come and shake thy hand, and now thou dost hold my hand and will not leave it." He put forth his left hand to the something, and the left hand became fastened also. "Well, well," said Spider, "what is it that thou wishest me to do? Thou hast caught my two hands. Dost want me to embrace thee?" He put his face to the shoulder of the something, and it remained fixed there so that he could not draw it back. He kicked with his two feet at the sticks, and they also were caught and held.

In this wise Spider remained all that day and until the morning of the next day, when the plantation owner came there and saw Spider fastened to the something. And the farmer said: "Hallo, Father Spider, and is it thou who hast been coming to take my cassava all this time? At last I have found thee out!"

Spider's wife and Spider's son Kwaku Tyom knew that Spider had gone to the farm, because they had not seen him in the house all the night.

The farmer said to Spider, "I have lost about two hundred and fifty cassavas from my farm since this began, and unless thou payest me thou wilt not go from here." Then Spider begged for pardon, and prayed the man to release him, saying that he would pay for all, and the farmer released him.

Then Spider said to the man that he must return home with him, and they went together; and when they arrived at Spider's house, they met there Spider's wife and son. The farmer said to Spider's wife: "I saw Spider in my farm this morning, quite fastened up, and, as I have lost about two hundred and fifty cassavas from my farm, I asked Spider concerning them, and he confessed it was he who had taken them, and said he would pay me, so I have come hither with him to receive payment."

Then Spider's son spake to Spider and said: "Father, I told thee not to go to the farm. My mother has told me that, when I was sleeping one night, thou didst put some ashes into my bag, and picked a hole in the bag; but I knew not when I was going next morning that the ashes were falling along the road. Now, father, how art thou going to pay for so much?" Spider answered softly, "Never mind, my son, I will pay him up in the roof."

Then Spider made an excuse to the farmer that he wanted to go into his sleeping room, but the farmer said: "No, I will not let thee do so, for thou art too tricky." But Spider begged the farmer, saying that he only wanted to go into the room to get the money wherewith to pay him, and that he would return at once; and at last, after much talking, the farmer left Spider.

Then, when Spider had moved about three steps from where

the farmer was sitting, he cried: "Oh! oh! daddy farmer, I have no money for thee. I will pay thee on the roof top." And he jumped at once into the rafters, where he said, "I shall not come down again."

Since then Spider has not come down from the roof, for he owes the farmer too much, and the farmer is still looking for him.

The eighteenth of Mr. Harris's tales, entitled Mr. Rabbit finds his Match at Last, describes how Brer Rabbit runs a race with the Terrapin, which the Terrapin wins by distributing his wife and children at the different mileposts along the track, and by concealing himself near the winning post, up to which he crawls when Brer Rabbit draws near. In the introduction Mr. Harris mentions a similar tale from the South Atlantic States, where the Terrapin, by the same stratagem, wins a race that he runs against the Deer. In this instance, however, the race is for a bride, who is to marry the winner, and so the tale probably has reference to the once widely distributed marriage custom known as "bride racing." The Gold Coast tale, equally with that of Uncle Remus, has no reference to marriage. It is as follows:

THE FROG AND THE LEOPARD.

One day the Frog challenged the Leopard to run a race with him from Axim to Accra, and the Leopard answered: "This is foolishness. A little slow-moving creature such as thou art could not race with me"; but the Frog said, "Yes, I will, and we will then see who is a man"; so the Leopard agreed, and they fixed a day for the race.

Then the Frog went to Axim, and he placed frogs all along the road from Axim to Accra. He hid them in the bush, putting here five and there ten; and when the time came, the Leopard came and called the Frog to go and race.

When they started, they started together, and the Leopard at once made one leap and came to Shamah, and when he alighted on the ground he called "Frog," and a frog answered "Yaow." The Leopard said: "What! such a little creature as that can beat me in a race? No, it is not possible. I will go on again"; and he skipped from Shamah to Kommenda, and when he alighted he called again, "Frog," and a frog answered "Yaow." Then the Leopard was ready to scream with vexation, he did not know what to do, and it was bitter to think that such a slow creature as a frog could leap as far as he.

The Leopard made another leap, and he leaped from Kommenda to Amkwana, and as he alighted he called "Frog," and a frog answered "Yaow." The Leopard said, "What! art thou here again?" and he was angry, and he made a bound from Amkwana

to Simpa, without touching anywhere, and when he came down at Simpa he called "Frog," and a frog said "Yaow." The leopard said: "I am the King of the Bush. Every creature is under me. I am the King, I can cut off heads, and yet a little creature like thee is able to race with me, and now thou seekest to beat me."

Then he leaped at once from Simpa to the Sakum River, and when he came there he thought, "Frog is not here," and he did not call the Frog, but said he would first drink some palm wine, because he was tired. And after he had drunk the palm wine he called "Frog," and a frog answered "Yaow." The Leopard asked, "What! art thou here, Frog?" And the frog again said "Yaow." Then the Leopard made a leap from that place and came to Accra, and called "Frog," and a frog answered "Yaow." At every place to which he came he met the Frog, because a frog was there before he leaped.

At that time the Frog lived in the bush—he lived there with all the other animals; but now the Leopard said to him, "I am the King of the Bush, and after this I will not keep thee there any more. I will put thee down close to the water side."

That is why ye can hear frogs crying by the water side whereever ye go. The Leopard has driven them out of the bush, because the Frog was the only animal that could race with him.

Another Gold Coast tale is:

HOW SPIDER AND KWAKU TSE KILLED THE KING'S COWS AND TOOK HIS WIVES.

There was a certain king who had two fine cows, and these two cows were in the same town with the king. In this town people often could not get meat to eat, but the king always had meat to eat from the two cows, for they used to void meat every morning.

Now, Spider and Kwaku Tse came to that town as strangers,* and when they came the people had no meat to eat; they had nothing but plantains and *dokonno*;† so Spider and Kwaku Tse asked the master of the house in which they lodged, since he had no meat to give them, to show them the house of the king.

Then Spider and Kwaku Tse went to the king, and said to him: "We are strangers who have come to thy town, and to-mor-

* It should perhaps have been stated before that Spider and his family are able to assume the human form at will. When Spider is in human shape he is small, lean, and hairy, and these peculiarities are shared by his children. In the tale of Spider and the Farmer it is to be understood that Spider goes to the farm in human shape and, when in his own house, escapes from the farmer by becoming a spider again and climbing up among the rafters.

† Dokonno—a kind of boiled maize bread.

row we will pass on our way, and we can find no meat to eat, but as we were coming hither to thee we saw two fine cows." The king answered, "The cows are mine, and they are not to kill." Spider asked, "Why should not the cows be to kill?" and the king answered, "They supply me with meat." Then Spider and Kwaku Tse asked the king if he could not give them even a small piece of meat, and the king refused.

They departed from the king and returned to the house in which they were lodging, and they told the owner of the house of all that they had said to the king, and how the king had refused to give them even a small piece of meat. They said to the man: "The king said that his two cows supplied him with beef, and that therefore he could not kill them." Spider said, "My name is Spider, and this man is my namesake Kwaku. Never before have I seen a cow that could supply meat and yet live. I came hither only to pass through and go upon my way, but now I will tarry here and see how it is that these cows can supply the king with meat." The owner of the house answered, "That thou wilt not be able to see, for they do it in the king's private yard." Spider said, "I am he who is called Kwaku Anansi, and anything in this world that I want to see or want to do and that I am not able to see or do, I have not yet found it." He said: "These two cows of the king, I will kill them and I will take their heads. I and my friend will do it; we will each kill one, and as for the heads of the cows, the king will cut them off and give them to us."

When Spider spake thus the owner of the house marveled greatly to hear such words, and he ran and called his neighbor and said to him, "Come and listen, for there is a great trouble which these strangers who have come to lodge with me are about to bring upon me." When the neighbor came the owner of the house told him, in the presence of Spider, what Spider had said, and Spider gave them a proverb, saying, "If the load on thy head is heavy, and it is something to eat, whilst thou art eating it thou art lightening it." Then Kwaku Tse said: "We have spoken this in thy house; it is no concern of any one else."

Then Spider and Kwaku Tse told the owner of the house that they were going out to see if they could not get the heads of the two cows and bring them there. And they departed and went to the king's yard, and it was night time, and they found the place wherein the cows used to sleep. Now they had with them a leaf that, when a person smelled it, it made him sneeze, and they rubbed the leaf upon the noses of the two cows. Then the cows at once looked as if they wanted to sneeze; they opened their mouths wide open, and Spider and Kwaku Tse turned themselves very small and each of them jumped into the mouth of a cow, and the

cows swallowed them up. Then they cut meat from the insides of the cows, but the cows did not die.

Next morning the king came to his cows to get meat, and the cows voided meat for the king, but this time the meat was not fresh as it always used to be, because Spider and Kwaku Tse had cut it and left it inside all night. The king said, "I wonder why the meat is not fresh as it always is?" and he sent for a medicine man to see if he could cure the cows, for he thought that they were sick. When the medicine man came, he said that the cows had eaten a bad leaf, and he poured medicine down their throats. Then the medicine purged them and they voided more meat, but it was all stinking.

When the king and the medicine man had gone away, and there was nobody left with the cows, Kwaku Tse came out and went into the cow in which was Spider, and when he came there he found that Spider had done the same as he, Kwaku Tse, had done in the other cow. He said to Spider: "I do not know why we can not make these two cows die. We have cut all the meat inside. I am going back to my cow, and after I have gone inside I will cut its belly right through with a knife." Spider answered: "No, do not do that. When thou goest in, thou must cut neither the belly nor the heart." Kwaku Tse asked, "Why not?" and Spider said, "Because if we kill the cows while we are yet inside, we shall not be able to get out again, and what shall we do then?" Kwaku Tse asked, "Why should we not be able to come out?" Then Spider said, "Is not thy mother dead?" and Kwaku Tse answered, "Yes." Spider said again, "And what caused her death?" and Kwaku Tse answered, "She died by poison." Spider said: "When she was dead, did not a medicine man come and try to make her sneeze or open her mouth, and did he not fail to do it? Thus thou must know that if the cows die while we are yet inside them, we can not get out. But we can hide ourselves, and that is what we will do. The king will rip open their bellies to discover the cause of their death, so thou must chop the meat on one side very small, so that they will think that the cows have received a blow, and have died therefrom. When the king rips open the cow thou must hide in the stomach, and if thou seest that they are about to search there, thou must run into the bowels and hide. When thou goest into thy cow now, after thou hast chopped the side as I told thee, thou must search for the heart and cut it down. When thou hast cut the heart down the cow will die, and then thou must be careful where thou hidest, so as to escape the knife with which they will open the belly. But before thou doest this, first run to the man in whose house we lodge and tell him that we are going to the water side to wash." Then Kwaku Tse went to the house-master and told him, and returned into the belly of

the cow, and chopped the side and cut the heart down, and the cow died. And Spider did the same in his cow, and both cows were dead.

When the king came and saw that his cows were dead, he ordered his people to go and bring the medicine man who had physicked the cows, and when the medicine man came he said that if the king would allow it he would rip open the cows' bellies. The king consented, and they ripped open the cows, and the medicine man said that something had struck the cows a blow in the side and that that was the cause of their death. The king asked the medicine man if the cows were still good to eat, and the medicine man said that they were. Then the king said: "When thou camest first to the cows thou didst say that they had eaten a bad leaf. How, then, can their flesh now be good to eat?" The medicine man answered that at first he thought the cows had eaten a bad leaf and were sick therefrom, but now he found that a blow had been struck them, and therefore the flesh would be good to eat. He said that the people must cut up the cows and carry the paunches to the water side and wash them.

Then the king had the cows cut up, and he ordered two of his slaves to carry the paunches to the water side; and when they went there they threw them down in the water. When the paunches fell into the water Spider and Kwaku Tse broke forth from their hiding places and changed themselves at once, and looked up at the two slaves and cried unto them: "See how ye have acted to us! see how ye have acted to us! We were bathing here in this water and ye came and cast cows' paunches upon us."

The two slaves were frightened, and they left the paunches and ran away and returned to the king and told him: "When we carried the cow paunches to the stream and cast them into the water, two men arose and said we had cast the cow paunches upon them. The king asked, "And did ye throw the paunches upon them?" The slaves answered: "We saw them not; but when they jumped up before us they were covered with the filth from the cow paunches." The king asked, "How deep was the place?" and the slaves answered that it was about the depth of a man's knees. Then the king said, "If it were only of that depth ye must have seen the men when ye cast in the cow paunches."

The king called two elders and sent them to the water side to see the two men, and when the elders came they found Spider and his friend covered with filth and the cow paunches in the water. Spider said to them: "That which these two slaves have done to us, if we were not strangers here in the town, we would deal with them for it. We asked if we might come here and wash before we came here." The elders said, "This is the place where we always are used to wash. The slaves have done wrong, but they

are the king's slaves, therefore we beg thee to let the matter rest." Spider answered: "Ye are begging us while the filth is still upon us. Ye can not beg us so with empty hands. If the cows have been killed 'twill not be so grave a matter, but if they have died our medicine will be spoiled, therefore we will go with ye and see the cows. When first we came to this town we could get no meat. We went to the king and told him we were strangers and had no meat to eat, and he told us he had no meat to give us."

While they were still talking by the water side, the son of the man in whose house Spider and Kwaku Tse were lodging came there and saw them with the elders, and he ran home and told his father. Then the father came to see what was the matter, but when he came he did not find the two strangers, for they had already departed with the elders to go to the king's house. Then he went to the king's house, and when he reached there the strangers and the two elders had not yet arrived. When the man came, the king asked him what he came for, and he answered: "Two strangers came to me three days past and lodged in my house. They went out this morning, and after a time one of them returned to me and told me they were going to the water side to wash. Afterward my son came and told me he had seen them at the water side talking with two elders. So I have come hither to learn what the matter is." The king asked: "What strangers are they? Whence do they come?" and the man answered: "King, thou knowest them. They are the two young men who came to thee and asked for meat, because they were strangers." Then the king said, "Ah! I know them now." He said: "When thou doest good for a man it is good for thyself.* These young men came and asked me for meat, and I said I had none to give them. Now my cows are dead, and the slaves whom I sent to wash the paunches at the water side have cast them upon the young men. I have sent two elders to go and soothe them, but they have not yet returned."

While the king was speaking, Spider and Kwaku Tse and the two elders came, and with them the slaves bearing the paunches of the cows, and Spider and Kwaku Tse were still covered with the dirt from the paunches. The king asked the elders: "The place where these slaves cast down the paunches, if any persons were there, could they see them?" The elders answered that the slaves could not fail to see them. Then the king said, "Then the slaves must have done this thing purposely," and the elders answered, "Thou hast said it." Spider said: "If thou art a stranger and thou goest to another country, they treat thee like a stranger, in truth. The slaves, when they saw my small body, they thought

* A proverb.

I was a young boy, or else they would not have done such a thing." The king said: "Thou must not say so. I am here for all people, for the townfolk and for strangers also, to protect them and be a father to them." Kwaku Tse answered: "How canst thou say thou art a father to the stranger? Did not we come and ask thee for meat, and didst not thou tell us that thou hadst only meat for thine own household?" Spider said: "In this world in which we live it is not everybody that likes everybody, so it behooves every man to keep a little medicine * to guide him. If the cows died of sickness then our medicine is spoiled, but if the cows were killed no great harm was done." The king said that the cows had died, and then Spider sang:

> "My namesake, Kwaku, we are wearied, we are wearied,
> We are wearied without cause."

The king asked what this song might mean, and Spider said that the little medicine which they possessed was a medicine which forbade them even to pass by dead animals, and now the flesh of animals that had died had been thrown upon them. He said: "Had these two slaves killed one of us, instead of throwing the paunches upon us, it would have been better, because the one who lived would have mourned for the other, and that is something. As we are standing before thee now, O king, if war came upon thee we are thy men. And if war did come upon thee now, we should be the first to die in battle on account of what thy slaves have done." He said, "No son can be older than his father." Then the king asked what this proverb might mean, and Spider and Kwaku Tse showed each a medicine that was upon their loins, and said: "This medicine, when we were born it was not upon us. After we were born we made it, and if thou wilt help us we will make fresh medicine again, and let this matter rest, for thy sake." The king said, "Whatever it is ye want, say it," and they answered, "That which we want, perchance thou thyself will want it also." The king said, "As ye are strangers, ask for what ye wish, and, even though I want it, ye shall have it." Then they said that they wanted the two heads and the two hearts of the very cows whose paunches had spoiled their medicine, and hair from two of the king's own wives. The king answered that he would give them the cows' heads and the two hearts, but as for his wives' hair, that was too much to ask. Spider said, "If the cows were not thine own it would be different, but as the cows were thine own we must ask for the hair." Then the king said he would give them the hair according to their wish, but only a little; and Spider and Kwaku Tse said that a little would suffice.

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* I. e., an amulet or charm.

Then the king called two of his wives, and when they came he was ashamed to tell them what he wanted, so he said to them that their hair had grown too much, and that they must cut it down. Then the two women went into their own room and cut the hair, and the king came behind them and gathered some of it and gave it to Spider and Kwaku Tse, together with the two heads and the two hearts of the cows.

Spider and Kwaku Tse departed from the king and carried all the things to the house wherein they lodged, and they told the house-master that they wished to marry and to give a wedding feast. The house-master said that there was no meat in the town, and though people passed by driving cows to other towns yet they would not sell them. Then Spider and Kwaku Tse took the two cows' heads, and went into the road where the people used to pass driving their cows, and there was much mire at a certain part of the road, and they took the two heads and planted them in the mire so that the severed necks were hidden.

By and by some people came driving cows, and Spider and Kwaku Tse called to them, and said: "We were passing here with our cows, and lo! this mire has swallowed them up, and we can not draw them out. Can ye take them out for us?" The people said "Yes"; and they left their own cows, and went and laid hold of the horns of the cows' heads that were in the mire, and pulled hard to pull the cows out, and when they pulled the two heads came up out of the mire. Then Spider and Kwaku Tse cried aloud and said: "See what ye have done! See what ye have done! Ye have pulled the heads off our cows and left the bodies still in the mire. Ye must pay us for our two cows." Then the people were obliged to give them two of their own cows, and they took the two heads and cast them among the bushes.

Spider and Kwaku Tse take the heads from the bushes and play the same trick upon some other passers-by, after which they make a medicine with the hair of the king's wives, and by means of it compel the two wives to come to them at night, and in the end deprive the king of his wives altogether.

This tale furnishes the material for two of the stories of Uncle Remus. The notion of entering a cow and cutting meat from its inside is to be found in No. XXXIV—The Sad Fate of Mr. Fox. Brer Rabbit and Brer Fox enter a cow and cut meat, and Brer Rabbit, through disregarding Brer Fox's injunction and cutting into the "haslet," kills the cow, so that they can not make their way out again. Then one hides in the maul and the other in the gall when the cow is cut open. The trick of planting the cows' heads in the mire and pretending that the animals had foundered appears in No. XX—How Mr. Rabbit saved his Meat—where Brer Rabbit plants a cow's tail in the earth and tells Brer Fox

that the cow has sunk into the ground. They both pull at the tail, and when it comes out Brer Rabbit winks his eye and says, "Dar! de tail done pull out en de cow gone."

No. XXXIII, Why the Negro is Black, is practically the same as the Gold Coast tale, Why Some People are Black and Some White. In the Uncle Remus variant there is a pool of water in which those who wash become white; but the water is soon used up, and the last comers only find enough to whiten the palms of their hands and the soles of their feet. In the Gold Coast tale the change of color is brought about by means of the blood of a handsome boy, who has committed suicide by casting himself down from a tree.

No. VI, Mr. Rabbit Grossly deceives Mr. Fox, which describes how Brer Rabbit, by a trick, rides Brer Fox to Miss Meadows's house, is like the Slave Coast tale, How the Tortoise rode the Elephant to Town, and the stratagem by which the Tortoise escapes being killed by the Elephant is similar to that employed by Brer Rabbit when Brer Fox is about to kill him (No. IV, How Mr. Rabbit was too Sharp for Mr. Fox), and also by the Terrapin when in the same dilemma (No. XII, Mr. Fox tackles Old Man Tarrypin). In the first case Brer Rabbit says, "I don't keer w'at you do wid me, Brer Fox, so you don't fling me in dat brier patch," and in the second the Terrapin begs Brer Fox not to drown him, but to burn him. In the Slave Coast tale, the Tortoise begs the Elephant to dash him down upon the stones, but not to throw him into the swamp, as the water and mire would drown him.

In No. XVII—Mr. Rabbit Nibbles up the Butter—where Brer Rabbit rubs the butter upon the mouth of the sleeping Opossum, and causes him to be thought guilty of the offense, we find a more delicate version of an incident in the Gold Coast tale—How the Cat got the Better of Spider—but as this paper has already reached sufficient length, this and the other stories above mentioned can not be given in detail.

PROF. ANGELO HEILPRIN points out as a field where thorough geographical explorations may be made with profit and additions to knowledge, the regions of the North Pacific uniting North America—by stepping stones—with Asia: the Aleutian Islands and peninsula, Bering Sea and Strait, and the peninsula of Kamchatka. "Where two continents approach one another so closely and give evidence of having been united at seemingly no very ancient date; where a connecting land-bridge could not but most effectually influence the distribution of life—human, animal, and vegetable—upon two hemispheres; there, manifestly, the harvest of exploration must be great, for bound in with the research are problems of deep significance, touching alike the sciences of physical geography, ethnology, geology, and botany."

STUDIES OF CHILDHOOD.

XII.—UNDER LAW.

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(*a*) THE STRUGGLE WITH LAW.

IN the last chapter we tried to get at those tendencies of child-nature which, though they have a certain moral significance, may in a manner be called spontaneous and independent of the institution of moral training. We will now examine the child's attitude toward the moral government with which he finds himself confronted.

Here, again, we meet with opposite views. Children, say some, are essentially disobedient and lawbreaking. A child as such is a rebel, delighting in nothing so much as in evading and dodging the rule which he finds imposed by others.

The view that children are instinctively obedient and law-abiding has not, I think, been very boldly insisted on. A follower of Rousseau at least, who sees only clumsy interference with natural development in our attempts to govern children, would say that child-nature must resist the artificial and cramping system which the disciplinarian imposes.

It seems, however, to be allowed by some that a certain number of children are docile and disposed to accept authority with its commands. According to them, children are either obedient or disobedient. This is probably the view of many mothers and pedagogues.

Here, too, it is probable that we try to make nature too simple. Even the latter view, in spite of its apparent wish to be discriminating, does not allow for the many-sidedness of the child and for the many different ways in which the instincts of child-nature may vary.

Now it is worth asking whether, if the child were naturally disposed to look on authority as something wholly hostile, he would get morally trained at all. Physically mastered and morally cowed he might, of course, become; but this is not the same thing as being morally induced into a habit of accepting law and obeying it.

In inquiring into this matter we must begin by drawing a distinction. There is first the attitude of a child toward the governor, the parent, or other ruler, and there is his attitude toward law as such. These are by no means the same thing, and a child of three or four begins to illustrate the distinction. He may seem to be lawless, opposed to the very idea of government, when, in

reality, he is merely objecting to a particular ruler and the kind of rule (or, as the child would say, misrule) which he is carrying out.

Let us look a little into the noncompliant, disobedient attitude of children. As we have seen, the very liveliness of a child, the abundance of his vigorous impulses, brings him into conflict with others' wills. The ruler, more particularly, is a great and continual source of crossings and checkings. The child has his natural wishes and propensities. He is full of fun, bent on his harmless tricks, and the mother has to talk seriously to him about being naughty. How can we wonder at his disliking the constraint? He has a number of inconvenient active impulses, such as putting things in disorder, playing with water, and so forth. As we all know, he has a ducklike fondness for dirty puddles. Civilization, which wills that a child should be nicely dressed and clean, intervenes in the shape of the nurse and soon puts a stop to this mode of diversion. The tyro in submission, if sound and robust, kicks against the restraint, yells, slaps the nurse, and so forth.

Such collisions are perfectly normal in the first years of life. We should not care to see a child give up his inclinations at another's bidding without some little show of resistance. These conflicts are frequent and sharp in proportion to the sanity and vigor of the child. The best children, best from a biological point of view, have, I think, most of the rebel in them. Not infrequently these resistances of young will to old will are accompanied by more emphatic protests in the shape of slapping, pushing, and even biting. The ridiculous inequality in bodily power, however, saves, or ought to save, the contest from becoming a serious physical struggle. The resistance where superior force is used can only resolve itself into a helpless protest, a vain yelling, or other utterance of baffled impulse.

If, instead of physical compulsion, authority is asserted in the shape of a highly disagreeable command, a child, before obedience has grown into a habit, will be likely to disobey. If the nurse, instead of pulling the mite away from the puddle, bids him come away, he may assert his self in an eloquent "I won't," or, less bluntly, "I can't come yet." If he is very much in love with the puddle and has a stout heart, he probably embarks in a tussle of words; "I won't," or, as the child will significantly put it, "I mus'n't," being bandied with "You must," until the nurse has to abandon the "moral" method and to resort, after all, to physical compulsion.

Our sample child has not, we will assume, yet got so far as to recognize and defer to a general rule about cleanliness. Hence it may be said that his opposition is directed against the nurse, as propounding a particular command, and one which at the moment

is excessively unpleasant. It is as yet not resistance to law as such, but rather to one specific interference of another's will.

At the same time we may detect in some of this early resistance to authority something of the true rebel nature—that is to say, the love of lawlessness, and, what is worse perhaps, the obstinate recklessness of the lawbreaker. The very behavior of a child when another will crosses and blocks the line of his activity is suggestive of this. The yelling and other disorderly proceedings, do not they speak of the temper of the rioter, of the rowdy? And then, the fierce persistence in disobedience under rebuke, and the wild, wicked determination to face everything rather than obey, are not these marks of an almost Satanic fierceness of revolt? The thoroughly naughty child sticks at nothing. Thus a little offender of four, when he was reminded by his sister, two years older, that he would be shut out from heaven, retorted impiously, "I don't care," adding, "Uncle won't go; I'll stay with him."*

The fierce and noisy utterance of the disobedient and law-resisting temper is eminently impressive. Yet it is not the only utterance. If we observe children who may be said to show, on the whole, an outward submission to authority we shall discover signs of secret dissatisfaction and antagonism. The conflict with rule has not wholly ceased; it has simply changed its manner of proceeding, physical assault and riotous shouts of defiance being now exchanged for dialectic attack.

A curious chapter in the psychology of the child which still has to be written is the account of the various devices by which the astute little novice called upon to wear the yoke of authority seeks to smooth its chafing asperities. These devices may, perhaps, be summed up under the head of "trying it on."

One of the simplest and most obvious of these contrivances is the extempore invention of an excuse for not instantly obeying a particular command. A child soon finds out that to say "I won't," when he is bidden to do something, is indiscreet as well as vulgar. He wants to have his own way without resorting to a gross breach of good manners, so he replies insinuatingly, "I's very sorry, but I's so busy," or in some such conciliatory words. This field of invention offers a fine opportunity for the imaginative child. A small boy of three years and nine months received from his nurse the familiar order, "Come here!" He at once replied, "I can't, nurse; I's looking for a flea," and he pretended to be much engrossed in the momentous business of hunting for this quarry in the blanket of his cot. The little trickster is such

* My correspondent, discreetly perhaps, does not explain why the uncle was selected as fellow-outcast.

a lover of fun that he is pretty certain to betray his ruse in a case like this, and our small flea-catcher, we are told, laughed mischievously as he proffered his excuse. Such sly fabrications may be just as naughty as the uninspired excuses of a stupidly sulky child, but it is hard to be quite as much put out by them.

These excuses often show a fine range of inventive activity. How manifold, for example, are the reasons, more or less fictitious, which a boy, when told to make less noise, is able to urge in favor of noncompliance! Here, of course, all the great matters of the play world, the need of getting his "gee-gee" on, of giving his orders to his soldiers, and so forth, come in between the prohibition and compliance. And disobedience in such cases has its excuses; for to the child his play-world, even though in a manner modeled on the pattern of our common world, is apart and sacred; and the conventional restraints as to noise and such like, borrowed from the every-day world, seem to him to be quite out of place in this free and private domain of his own.

We all know the child's aptness in "easing" the pressure of commands and prohibitions. If, for example, he is told to keep perfectly quiet because mother or father wants to sleep, he will prettily plead for the reservation of whispering ever so softly. If he is bidden not to ask for things at the table, he will resort to sly indirect reminders of what he wants, as when a boy of five years and a half whispered audibly, "I hope somebody will offer me some more soup," or when a girl of three years and a half, with still greater childish tact, observed on seeing the elder folk eating cake, "I not asking." This last may be compared with a story told by Rousseau of a little girl of six years who, having eaten of all the dishes but one, artfully indicated the fact by pointing in turn to all the dishes, saying, "I have eaten that," but carefully passing by the untasted one.*

When more difficult duties come to be enforced and the neophyte in the higher morality is bidden to be considerate for others, and even to sacrifice his own comfort for theirs, he is apt to manifest a good deal of skill in adjusting the counsel of perfection to young weakness. Here is an amusing example: A little boy, Edgar by name, aged five years and three quarters, was going out to take tea with some little girls. The mother, as is usual on such occasions, primed him with special directions as to behavior, saying, "Remember to give way to them, like father does to me." To which Edgar, after thinking a brief instant replied; "Oh, but *not* all at *once*. *You* have to *persuade* him."

A like astuteness will show itself in meeting accusation. The

* Émile, livre v, quoted by Perez, L'Art et la Poesie chez l'Enfant, p. 127. Rousseau uses this story in order to show that girls are more artful than boys.

various ways in which a child will seek to evade the point in such cases are truly marvelous, and show the childish intelligence at its ablest.

Sometimes the dreary "talking to," with its well-known deep accusatory tone, its familiar pleadings, "How can you be so naughty?" and the rest, is daringly ignored. After keeping up an excellent appearance of listening, the small culprit proceeds in the most artless way to talk about something more agreeable. This is trying, but is not the worst. The deepest depth of maternal humiliation is reached when a carefully prepared and solemnly delivered homily is rewarded by a *tu quoque* in the shape of a correction of something in the delivery which offends the child's sense of propriety. This befell one mother who, after talking seriously to her little boy about some fault, was met with this remark: "Mamma, when you talk you don't move your upper jaw."

It is, of course, difficult to say how far a child's interruptions, and what look like turnings of the conversation when receiving rebuke, are the result of deliberate plotting. We know it is hard to hold the young thoughts long on any subject, and the homily makes a heavy demand in this respect, and its theme is apt to seem dull to a child's lively brain. The thoughts will be sure to wander then, and the rude interruptions and digressions may, after all, be but the natural play of the young mind. I fear, however, that design often has a hand here. The first digression to which the weak disciplinarian succumbed may have been the result of a spontaneous movement of child-thought; but its success enables the observant child to try it on a second time with artful aim.

In cases in which no attempt is made to ignore the accusation, the small wits are busy discovering palliatives and exculpations. Here we have the many ruses, often crude enough, by which the little culprit tries to shake off moral responsibility, to deny the authorship of the action found fault with. The blame is put on anybody or anything. When he breaks something, say a cup, and is scolded, he saves himself by saying it was because the cup wasn't made strong enough, or because the maid put it too near the edge of the table. There are clear indications of fatalistic thought in these childish disclaimers. Things were so conditioned that he could not help doing what he did. This fatalism betrays itself in the childish ruses already referred to by which the *ego* tries to screen itself shabbily by throwing responsibility on to the bodily agents. This device is sometimes hit upon very early. A wee child of two, when told not to cry, gasped out, "Elsie cry—*not* Elsie cry—tears cry—naughty tears." This, it must be allowed, is more plausible than C——'s lame attempt to put off responsibility on his hands; for our tears are in a sense apart from us, and in the first years are wholly beyond control.

The fatalistic form of exculpation meets us later on under the familiar form, "God made me like that." A boy of three was blamed for leaving his crusts, and his conduct contrasted with that of his model papa. Whereupon he observed with a touch of metaphysical precocity, "Yes, but papa you see God had made you and me different."

These denials of authorship occur when a charge is brought home and no clear justification of the action is forthcoming. In many cases the shrewd intelligence of the child, which is never so acute as in this art of moral self-defense, discovers justificatory reasons. In such a case the attitude is a very different one. It is no longer the helpless hand-lifted attitude of the irresponsible one, but the bold, steady-eyed attitude of one who is prepared to defend his action.

Sometimes these justifications are pitiful examples of quibbling. A boy has been rough with his baby brother. His mother chides him, telling him he might hurt baby. He then asks his mother, "Isn't he my own brother?" and on his mother admitting so incontestable a proposition, exclaims triumphantly, "Well, you said I could do what I liked with *my own* things." The idea of the precious baby being a boy's own to do what he likes with is so remote from older people's conceptions that it is hard for us to credit the boy with misunderstanding. We ought, perhaps, to set him down as a depraved little sophist, and destined— But predictions happily lie outside our *métier*.

In some cases these justifications have a dreadful look of being after-thoughts invented for the express purpose of self-protection and knowingly put forward as fibs. Yet there is need of a wise discrimination here. Take, for example, the following from the Worcester Collection: A boy of three was told by his mother to stay and mind his baby sister while she went downstairs. On going up again some time after, she met him on the stairs. Being asked why he had left the baby, he said there was a bumblebee in the room, and he was afraid he would get stung if he stayed there. His mother asked him if he wasn't afraid his little sister would get stung. He said "Yes," but added that if he stayed in the room the bee might sting them both, and then she would have two to take care of. Now, with every wish to be charitable I can not bring myself to think that this small boy had really gone through that subtle process of disinterested calculation before vacating the room in favor of the bumblebee—if indeed there was a bumblebee. To be caught in the act and questioned is, I suspect, a situation particularly productive of such specious fibbing.

One other illustration of this keen childish dialectic when face to face with the accuser deserves to be touched on. The sharp little wits have something of a lawyer's quickness in detecting a

flaw in the indictment. Any exaggeration into which a feeling of indignation happens to betray the accuser is instantly pounced upon. If, for example, a child is scolded for pulling kitty's ears and making her cry, it is enough for the little stickler for accuracy to be able to say: "I wasn't pulling kitty's *ears*, I was only pulling *one* of her ears." This ability to deny the charge in its initial form gives the child a great advantage, and robs the accusation in its amended form of much of its sting. Whence, by the way, one may infer that wisdom in managing children shows itself in nothing more than in a scrupulous exactness in the use of words.

While there are these isolated attacks on various points of the daily discipline, we see now and again a bolder line of action in the shape of a general protest against its severity. Children have been known to urge that the punishments inflicted on them are ineffectual; and although their opinion on such a matter is hardly disinterested, it is sometimes pertinent enough. An American boy, aged five years and ten months, began to cry because he was forbidden to go into the yard to play, and was threatened by his mother with a whipping. Whereupon he observed, "Well now, mamma, that will only make me cry more."

These childish protests are, as we know, wont to be met by the commonplaces about the affection which prompts the correction. But the child finds it hard to swallow these subtleties. For him love is caressing him and doing everything for his present enjoyment; and here is the mother who says she loves him, and often acts as if she did, transforming herself into an ogre to torment him and make him miserable. He may accept her assurance that she scolds and chastises him because she is a good mother; only he is apt to wish that she were a shade less good. A boy of four had one morning to remain in bed till ten o'clock as a punishment for misbehavior. He proceeded to address his mother on this wise: "If I had any little children I'd be a worse mother than you —I'd be quite a bad mother. I'd let my children get up directly I had done my breakfast, at any rate."

If, on the other hand, the mother puts forward her own comfort as the ground of the restraint, she may be met by this kind of thing: "I wish you'd be a little more self-sacrificing and let me make a noise."

Enough has been said to illustrate the ways in which the natural child kicks against the imposition of restraints on his free activity. He begins by showing himself an open foe to authority. For a long time after, while making a certain show of submission, he harbors in his breast something of the rebel's spirit. He does his best to avoid the most galling parts of the daily discipline, and displays an admirable ingenuity in devising excuses for apparent

acts of insubordination. Where candor is permitted he is apt to prove himself an exceedingly acute critic of the system which is imposed on him.

All this, moreover, seems to show that a child objects not only to the particular administration under which he happens to live, but to all law, as implying restraints on free activity. Thus, from the child's point of view, so far as we have yet examined it, punishment as such is a thing which ought not to be.

So strong and deep-reaching is this antagonism to law and its restraints apt to be that the childish longing to be "big" is, I believe, grounded on the expectation of liberty. To be big means to the child more than anything else to be rid of all this imposition of commands, to be able to do what one likes without interference from others. This longing may grow intense in the breast of a quite small child. "Do you know," asked a little fellow of four years, "what I shall do when I'm a big man? I'll go to a shop and buy a bun and pick out all the currants." This funny story is characteristic of the movements of young desire. The small prohibition not to pick out the currants is one that may chafe to soreness a child's sensibility.

SKETCH OF ALEXANDER DALLAS BACHE.

THE life which is to be sketched in the following pages contributes support to the doctrine that what a man is to be, or, rather, what he is capable of being, is mainly determined by what his parents and ancestors have been. According to the doctrine of heredity, it is not surprising that Bache, descended from illustrious progenitors on both sides of his family, should himself achieve intellectual eminence. As he received an education that was very appropriate for the work he was to perform, his career does not give any help in answering the question whether heredity is or is not stronger than training.

His most important work is instructive in another way. It shows how effective efforts for the advancement of knowledge made by the power and resources of a great government can be when the right man is secured to direct them, just as other instances have made plain how wasteful and demoralizing such efforts may become when unwisely managed.

ALEXANDER DALLAS BACHE was born in Philadelphia, July 19, 1806. His father, Richard Bache, was a grandson of Benjamin Franklin, being one of the eight children of Richard Bache, Postmaster-General from 1776 to 1782, and Franklin's only daughter, Sarah. His mother, Sophia Burret (Dallas), was a daughter of

Alexander J. Dallas, who was Madison's Secretary of the Treasury, and sister of George M. Dallas, Vice-President of the United States in Polk's administration.

Dallas Bache, as he was usually called by his intimates, was placed in a classical school at an early age, and proved to be a remarkably bright pupil. The year he was fifteen years old he was appointed a cadet in the Military Academy at West Point. He maintained a high stand in scholarship from the beginning to the end of his course, and graduated in 1825 at the head of his class, although its youngest member. This was no small achievement in a class from which four cadets were assigned to the engineer corps, when only one or two members attained this honor in most classes. Moreover, he went through the whole four years without receiving a demerit mark—equally remarkable in view of the rigid discipline of the academy, and the only instance on record. Students are none too prone to admire one of their fellows who is noted only for studious habits and correct deportment, but young Bache had besides the personal qualities that win esteem. Prof. Joseph Henry, in his memoir read before the National Academy of Sciences, relates of cadet Bache that "his superiority in scholarship was freely acknowledged by every member of his class, while his unassuming manner, friendly demeanor, and fidelity to duty secured him the affection as well as the respect of not only his fellow-pupils, but also of the officers of the institution. It is also remembered that his classmates, with instinctive deference to his scrupulous sense of propriety, forbore to solicit his participation in any amusement which in the slightest degree conflicted with the rules of the academy. So far from this, they commended his course, and took pride to themselves, as members of his class, in his reputation for high standing and exemplary conduct. His roommate—older by several years than he was, and by no means noted for regularity or studious habits—constituted himself, as it were, his guardian, and sedulously excluded all visitors or other interruptions to study during the prescribed hours. For this self-imposed service, gravely rendered as essential to the honor of the class, he was accustomed jocularly to claim immunity for his own delinquencies or shortcomings."

All of young Bache's predispositions for good were stimulated and sustained by the judicious care of his mother, not only while he was a child at home, but also by means of a ready pen during the whole of his residence at West Point. It should not be inferred that the young man attained perfection in his conduct. "When a child he is said to have been quick-tempered, and at later periods of his life, when suddenly provoked beyond his habitual power of endurance, he sometimes gave way to manifestations of temper which might have surprised those who only knew

him in his usual state of calm deportment. These ebullitions were, however, of rare occurrence, and always of short duration."

On graduating, Lieutenant Bache was assigned to duty at the academy as assistant professor. A year later he was transferred at his own request to engineering service on the fortifications at Newport, R. I., under Major (afterward General) J. G. Totten. Here he remained two years. One of his recreations during this period was making a collection of shells of mollusks.

In 1828, being then twenty-two years of age, Lieutenant Bache resigned his commission in the army to accept a call to the chair of Natural Philosophy and Chemistry at the University of Pennsylvania. This change was welcome in more ways than one. He was engaged to Miss Nancy Clarke Fowler, the daughter of an old and highly respected citizen of Newport, but marriage was apparently a remote prospect, for he had only the stinted pay of a lieutenant of engineers, out of which he must contribute to the support of his mother and her younger children. The salary of his new position, however, justified him in hastening the happy event.

His year's experience in teaching at West Point assisted Mr. Bache in taking up his duties at the university. He was a very successful instructor, and popular with his students. But he did not rest content with imparting knowledge obtained by the labors of others. He joined the Franklin Institute, then newly established, and took a prominent part in its investigations for the promotion of the mechanical arts.

For a full account of his labors in connection with this society we must here be content with referring to the volumes of its Journal from 1828 to 1835 inclusive. One of the most important and fruitful of these was the investigation of the bursting of steam boilers, of which he was the principal director. From inquiries and experiments, the latter not unattended with danger, "the most frequent cause of explosion was found to be the gradual heating of the boiler beyond its power of resistance; and, next to this, the sudden generation of steam by allowing the water to become too low, and its subsequent contact with the overheated metal of the sides and other portions of the boiler. The generation of gas from the decomposition of water as a cause of explosion was disproved, as was also the dispersion of water in the form of spray through superheated steam."

Early in 1829 Mr. Bache was elected to membership in the American Philosophical Society, and at once entered upon various researches in pure science in co-operation with his fellow-members. With the aid of his wife and of his former pupil, John F. Fraser, he determined with accuracy, for the first time in this country, the periods of the daily variations of the magnetic

needle, and by another series of observations established the connection between certain perturbations of the terrestrial magnetism and the aurora borealis. With Prof. Courtenay he investigated the magnetic dip at various places in the United States, and with Mr. Espy made a minute survey of part of the track of a tornado which visited New Jersey, June 19, 1835.

After Stephen Girard died, in 1832, Prof. Bache was elected one of the trustees of the College for Orphans, founded by the will of the childless merchant. Three years later the trustees decided to select a president for the institution, in order that he might go abroad and study European methods of education while other preparations were being made. Prof. Bache, then only thirty years of age, was selected for the position. Although regretting the consequent interruption of his scientific researches, in which he had become much absorbed, he accepted the appointment, and departed on his mission, September 30, 1836. Two years were spent agreeably and profitably in Europe, and on his return Prof. Bache made a report to the trustees embodying his observations on the schools of England, France, Prussia, Austria, Switzerland, and Italy, with the many helpful conclusions and suggestions that he had derived from these data. The document was printed, making a large octavo volume.

As the preparations for opening the college were not yet complete, Prof. Bache offered his services gratuitously to reorganize the public schools of Philadelphia, and his offer was gladly accepted by the municipal authorities. A year later, finding that the trustees of the college were still unprepared to open the institution, he relinquished the salary of his office and accepted from the city a much smaller compensation for his time. His work on the public schools was completed in 1842, and resulted in a system that has been taken as a model by other cities in various parts of the United States. So highly were his labors appreciated that the Central High School was frequently called Bache Institute.

Girard College having made very little progress, he now resigned all connection with it, and accepted his former chair at the University of Pennsylvania, with its welcome opportunities for scientific research. The preceding six years had by no means been a blank with respect to his favorite investigations. When he went to Europe he took care to provide himself with a set of portable instruments, with which, as a relief from the labors imposed by the special object of his mission, he made a connected series of observations on the dip and intensity of terrestrial magnetism at important places on the Continent and in Great Britain.

After his return to Philadelphia he co-operated in the undertaking of the British Association to determine by contemporaneous observations at widely separated points the fluctuations of

the magnetic and meteorological elements of the globe. He also made in his summer vacations a magnetic survey of Pennsylvania. Mr. Cramp, afterward the famous shipbuilder, was then a boy in the high school, and assisted Prof. Bache in his observations.

Valuable instruments and methods for performing scientific observations were devised by Bache during this period. He invented an ingenious instrument for determining the dew point, which is especially valuable where readings must be made by persons without special scientific training. Only much later did he learn that the principle of the device had already been used by Belli, of Milan. He also introduced a modification of Osler's anemometer and invented a thermoscope of contact, both of which avoided difficulties involved in the use of previous instruments.

The way in which a man conducts a controversy is always a severe test of his character. Bache had one with Denison Olmsted on the periodical recurrence of meteors. Prof. Gould, in his American Association memoir, thus describes the occurrence: "Mr. Bache maintained that there was no recurrence in 1834; Prof. Olmsted, on the other hand, maintained the reverse. Prof. Bache instituted special inquiries at the military posts (where, of course, sentinels were on duty) along all the frontiers of the United States, also among the night police of various cities, and at the universities, and he found but one exception to the statement that no unusual number of meteors was seen. Of this controversy Bache wrote, in 1846:

"'There is something yet to be found out on this subject which may reconcile our opinions. Neither I nor any of those watching with me, or for me, have seen an unusual number of meteors on the night of the 12th of November in any year since the great night at Philadelphia, and we have taken great pains to be sure. Yet I can not doubt the testimony as given for some other places. . . . I had a complimentary letter from the professor in regard to my manner of conducting the controversy, which I valued more highly than if I had gained the victory.'"

The year after Prof. Bache resumed his old position at the university he was called to the superintendency of the United States Coast Survey, left vacant by the death of Mr. Hassler. His appointment to this position was first suggested by members of the American Philosophical Society, and the nomination was fully concurred in by the other principal scientific and literary institutions of the country.

Although the Coast Survey had been founded a quarter of a century, the policy of Congress toward it had been changeable and its appropriations limited. It had been suspended fifteen years of that time, so that its work was but just begun. The At-

lantic coast line had been surveyed only from Point Judith, on the coast of Rhode Island, to Cape Henlopen, at the entrance of Delaware Bay. "The new superintendent," says Prof. Henry in his memoir, "saw the necessity of greatly enlarging the plan, so as to embrace a much broader field of simultaneous labor than it had previously included. He divided the whole coast line into sections, and organized, under separate parties, the essential operations of the survey simultaneously in each. He commenced the exploration of the Gulf Stream, and at the same time projected a series of observations on the tides, on the magnetism of the earth, and the direction of the winds at different seasons of the year. He also instituted a succession of researches in regard to the bottom of the ocean within soundings, and the forms of animal life which are found there, thus offering new and unexpected indications to the navigator. He pressed into service, for the determination of longitude, the electric telegraph; for the ready reproduction of charts, photography; and for multiplying copperplate engravings, the new art of electrotyping. In planning and directing the execution of these varied improvements, which exacted so much comprehensiveness in design and minuteness in detail, Prof. Bache was entirely successful. He was equally fortunate, principally through the moral influence of its character, in impressing upon the Government, and especially upon Congress, a more just estimate of what such a survey required for its maintenance and creditable prosecution. Not only was a largely increased appropriation needed to carry out this more comprehensive plan, but also to meet the expenses consequent upon the extension of the shore line itself. Our seacoast, when the survey commenced, already exceeded in length that of any other civilized nation, but in 1845 it was still more extended by the annexation of Texas, and again, in 1848, by our acquisitions on the Pacific. Prof. Bache was in the habit of answering the question often propounded to him by members of Congress, 'When will this survey be completed?' by asking, 'When will you cease annexing territory?'"

Prof. Bache's policy of dividing the Atlantic and Gulf coast (we had no Pacific coast in 1843) into sections, and carrying on work in all the sections at the same time greatly allayed sectional jealousies in States which the previous operations of the survey had not reached and had great influence in winning public favor for the survey. He had a wonderful faculty for enlisting the efforts and talents of others in carrying out his plans. "As rapidly as means allowed, the services of American scientists throughout the land were enlisted in aid of the survey, and the whole intellectual resources of the country thus made tributary to its usefulness and success. Thus Walker, Peirce, Bailey, Agassiz, Barnard,

Kendall, Mitchell, Bond, Alexander, and many others, were called on to assist in the advancement of the undertaking; and this large and wise policy prevailed during the whole period of his superintendence."* Many of the ablest officers of the navy and the army were brought into the Coast Survey service, and gained experience of great value in the duties many of them were afterward called upon to perform in the civil war.

The efficiency of the survey was greatly increased by improved instrumental equipment. Antiquated instruments were replaced by those of the most improved type; an apparatus for the measurement of base lines, invented by Prof. Bache, was introduced, and secured a degree of accuracy before unknown. The method of determining longitude by the exchange of star signals was developed through the agency of Sears C. Walker. Prof. Gould has stated that he had received accounts of this important advance in geodetic practice from the lips of both Bache and Walker, and that "their descriptions varied but in one salient point, namely, that each ascribed the chief merit to the other." The determination of latitudes with the zenith telescope, by Talcott's method, first tested in 1845, was early adopted by the survey. "Thus by the use of the zenith telescope, combined with the determination of longitudes from the adopted meridian by the exchange of star-signals, the geographical position of the primary astronomical stations of the survey could claim, ten or fifteen years ago, to be determined with more accuracy than that of any European observatory."

Stations for tidal observation were established all along the Atlantic, Gulf, and Pacific coasts. The character of the Gulf Stream and other currents along our coast were determined. Twice was Agassiz sent to study the formation of the coral reefs of Florida, and the causes that promote and restrict their growth. The magnetic constants were determined for every important point possible within reach of the survey.

Other duties were assigned to Prof. Bache by the Government from time to time. He was made Superintendent of Weights and Measures, and in the exercise of this function directed a series of investigations relative to the collection of excise duties on distilled spirits, and superintended the construction of a large number of sets of standard weights and measures for distribution to the several States of the Union. He was appointed on a commission created to examine the lighthouse system of the United States, and was a member of the Lighthouse Board, into which this commission was merged, from its organization till

* Address in commemoration of Alexander Dallas Bache, by Benjamin Apthorp Gould, delivered before the American Association for the Advancement of Science, August 6, 1868.

his death. In this work he took a lively interest and rendered important service.

As to the connection of Prof. Bache with the Smithsonian Institution we can not have better testimony than that of him who was identified with the institution for more than thirty years, its first secretary. Prof. Henry says: "In 1846 he had been named in the act of incorporation as one of the regents of the Smithsonian Institution, and by successive re-election was continued by Congress in this office until his death, a period of nearly twenty years. To say that he assisted in shaping the policy of the establishment would not be enough. It was almost exclusively through his predominating influence that the policy which has given the institution its present celebrity was, after much opposition, finally adopted." * Not the least of Bache's services to the institution was securing Henry for its secretary. The latter states, in the place just quoted, that "it was entirely due to the persuasive influence of the professor" that he was induced to take the position.

Although not fond of physical exertion, Prof. Bache had been accustomed to spend part of each summer in a tent at some station of the survey on the top of a mountain, where he took part in the measurement of angles and directed the movements of field parties at other stations. The civil war brought added labors upon him so that his constant presence in Washington was required, and his health no longer obtained the yearly recuperation of this season of outdoor life. Being solicited by the Governor of Pennsylvania to plan lines of defense for Philadelphia, he consented, although overburdened with other public duties, and personally superintended the construction of some of the works. Unaccustomed for many years to direct exposure to the sun, this undertaking brought on the first indications of the malady that ended his life. He had been subject to attacks of "sick headache"—a tendency which he seems to have inherited—and now various symptoms of softening of the brain came upon him in succession. For several months he was very anxious about the business of the Coast Survey, and with difficulty could be restrained from attempting to perform the duties of his office. As the malady increased, however, his attention was gradually withdrawn from the exterior world, with which he almost ceased to hold active communication. A trip to Europe, covering a period of eighteen months, produced no permanent benefit. He died a short time after his return, at Newport, R. I., February 17, 1867.

The ability and worth of Dallas Bache brought him many and high honors. There were few for our leading learned societies

* Biographical Memoirs of the National Academy of Sciences, i, 197, 198.

that did not number him among their associates. He was President of the American Association for the Advancement of Science in 1850 and 1851, of the American Philosophical Society in 1855 and 1856, and of the National Academy of Sciences from its establishment in 1863 until his death. He was a member also of the Royal Society of London, the Imperial Academy of Sciences at St. Petersburg, the Institute of France, the Royal Society of Edinburgh, the Royal and Imperial Geographical Society of Vienna, the Royal Academy of Turin, the Mathematical Society of Hamburg, the Academy of Sciences in the Institute of Bologna, the Royal Astronomical Society of London, and the Royal Irish Academy of Dublin.

The degree of LL. D. was conferred upon him by the principal American universities, and he received several medals from foreign governments for his distinguished services to science in the course of his labors on the Coast Survey and in other researches.

Mr. Bache was gifted with quick apprehension, and at the same time with deep intelligence, which is not always allied to the former quality. He had also great power of application. When at the head of a body of workers those under him were always nerved to do their best, because they saw that the master did not spare himself. He was always ready to learn from others. He would listen carefully to younger men if he saw that they had ideas which might be developed to good purpose. After arguing vehemently in opposition to the views of his brother on a matter under consideration, he would often come out on the same side of the question, and explain that his contention was designed to draw out arguments.

In his home he dropped science, and was a genial companion of old and young. Although not prepossessing in face, he was charming in manner and disposition. He was a very lovable man, and there was always plenty of company at his house in Washington. His favorite relaxation was reading light novels. He had a great appreciation of humor, but failed in trying to contribute humorously to the entertainment of others.

As an evidence of his high appreciation of abstract science derived from original investigation, he left his property in trust to the National Academy of Sciences, the income to be devoted to the prosecution of researches in physical and natural science, by assisting experimenters and observers, and the publication of the results of their investigations.

Appended to the memorial address by Dr. Benjamin A. Gould already cited is a list of the published scientific papers of Prof. Bache, embracing one hundred and twenty-three titles, besides thirty-five annual reports, and twenty-one reports on harbors made jointly with Messrs. Totten and Davis.

Correspondence.

ARE ANIMALS LEFT-HANDED?

Editor Popular Science Monthly:

In The Popular Science Monthly for March, 1894, page 615, Prof. J. Mark Baldwin says, in a footnote: "I know only the assertion of Vierordt that parrots grasp and hold food with the left claw, that lions strike with the left paw, and his quotation from Livingstone — i. e., 'All animals are left-handed.' (Vierordt, *loc. cit.*, page 428.) Dr. W. Ogle reports observations on parrots and monkeys in Trans. Royal Med. and Chirur. Society, 1871."

I have tried to verify these observations on two parrots lately brought from Mexico. I find that in grasping a finger offered as a perch the parrots almost always put the left foot forward. Usually the finger thus offered is that of the right hand. But when the left finger is offered to the parrots they put forward the right foot. There is, however, apparently a small residuum of preference for the left foot. This seems to be due to the fact that men are usually right-handed and offer the right hand to the parrot. The left foot is the one naturally put forward by the parrot in this case, and through repetition of this action a species of left-footedness is induced. My general conclusion is that there is no evidence that the parrot is naturally left-footed. The appearance of left-footedness is due entirely to the fact that those who offer the finger or food to parrots do so as a rule with the right hand. Repetition of this process makes the parrot more or less left-footed in time.

DAVID S. JORDAN.

PALO ALTO, CAL., *May* 16, 1895.

IMITATIVE HABITS OF THE BLUE JAY.

Editor Popular Science Monthly:

SIR: In reading Variation in the Habits of Animals, I see the author is not in line with The Study of Birds Out-of-doors, or she would not have written, "The practice of mocking the hawk is, at present at least, confined, so far as I know, to the individuals of such limited area—this one town—that with Mr. Ridgway we must believe this peculiarity exhibited by the blue jay to be scarcely the 'manifestation of a regional impress.'"

My boyhood and early manhood were spent in the country, in middle Tennessee, where I had ample opportunity to observe the habits and, I might say, peculiarities of certain birds. The blue jay not only mocks the hawk, which I have heard him do hundreds of times, but mocks also many other birds. The catbird possesses this faculty in a remarkable degree, and so rapidly does he "change his tune" that if he was not visible we should be apt to say, What a lovely mocking bird you have singing in your apple tree! Don't again mistake the jay for a hawk, for wherever you hear the jay he mocks the hawk, redbird, and many of his other neighbours. Yours truly,

W. A. HOWARD, M. D.

WACO, TEXAS, *September* 7, 1895.

Editor Popular Science Monthly:

DEAR SIR: I noticed in the September Monthly, in the article, Variation in the Habits of Animals, by G. C. Davenport, that the writer speaks of the blue jay (*Cyanurus cristata*, or more recently *Cyanocitta cristata*) as acquiring and using the cry of the hawk in order to assist in the fight with English sparrows, and she seemed to imply that it was an accomplishment of the blue jay in that region only. I have heard in the wooded lands of southeastern Indiana the blue jay give a fairly good imitation of the shrill, piercing, drawn-out cry of the large chicken hawk (*Buteo borealis*) at different times for as much as twenty years. I think this cry has not been developed in this region, at least, in the fight with recent enemies, but rather that the blue jay—robber and despoiler that he is—has now and then used this cry to terrify smaller birds for untold years.

Yours truly,

Prof. GLENN CULBERTSON.

HANOVER COLLEGE, HANOVER, IND., *September* 19, 1895.

ORIGIN OF THE TERM AGNOSTIC.

Editor Popular Science Monthly:

SIR: In the September Forum appears an article on Prof. Huxley by Richard H. Hutton, editor of The Spectator, in which, on pages 27 and 28, he states that Prof. Huxley "claimed to be in the strictest sense an Agnostic," and further states that Prof. Huxley borrowed that term from an "incident related in the Acts of the Apostles," where reference is made to the fact that the Athenians had erected an altar "Agnosto Theo"—to the Unknown God. Is not Mr. Hutton mistaken in regard to the origin of this term? In a letter written to Mr. J. A. Skilton, December 10, 1889, and published in

the Popular Science Monthly for June, 1890, Mr. Huxley expressly states that the term "Agnostic" was not suggested by the passage to which Mr. Hutton refers, but came into his mind "as a fit antithesis to 'Gnostic'—the 'Gnostics' being those ancient heretics who professed to know most about those very things of which I am quite sure I know nothing." As the use of the term in theological discussion has become universal, it is interesting to know how Prof. Huxley came to introduce it

J. T. GORMAN.

OPELIKA, ALA., *September* 14, 1895.

Editor's Table.

THE PRESENT POSITION OF ANTHROPOLOGY.

AMONG the scientific addresses of the present year we are disposed to assign a high place in point of interest and general merit to that on The Aims of Anthropology, delivered at the August meeting of the American Association for the Advancement of Science by the retiring president, Prof. Brinton, and reprinted in this number of the Monthly. Like others who have advocated the claims of that science, the professor almost overwhelms us with the enumeration of all its tributary streams of knowledge; but more successfully than most, he enables us to keep in view the unity of aim in anthropological study. He makes us feel that it is concerned not with unrelated or but slightly related details in regard to man, but with man himself, as a great organic fact, as the crowning product of creation, whom to know is for each of us in the truest sense self-knowledge. "Hearken unto me," said the prophet of old, "all ye that love righteousness! Look unto the rock whence ye are hewn, and the hole of the pit whence ye are digged." It is in the same spirit, we imagine, that Dr. Brinton asks us to look into our origins, and into whatever else can throw light upon what we really are. As regards the origin of man, science, he asserts, has now established beyond cavil that, far from having fallen from some original high estate and forfeited a pristine paradise, the earliest man was also "the lowest, the most ignorant, the most brutish, naked, homeless, half speechless." Such as he was, however, he had within him that which made possible for him a progress denied to all other animal races, that secured for him long since the mastery of the planet, and that holds out to him the prospect of a future civilization far in advance of anything he has heretofore enjoyed.

The most vitalizing discovery that has been made within recent years, in its bearings upon anthropology, Dr. Brinton considers to be that of the psychical unity of mankind, "the parallelism of his development everywhere and in all times; nay, more, the nigh absolute uniformity of his thoughts and actions when in the same degree of development, no matter where he is or in what epoch living." Seeing that savage tribes represent a stage of human culture which has left traces in ourselves, but the perfect manifestation of which will soon have passed away forever, he calls earnestly for a prolonged and profound study of such savage races as still exist, though none of them are in his opinion quite low enough to represent fully primitive man. He also strongly recommends the study

of folklore, inasmuch as "the stories, the superstitions, the beliefs, and customs which prevail among the unlettered, the isolated, and the young, are nothing else than survivals of the mythologies, the legal usages, and the sacred rites of earlier generations. . . . It is surprising," he adds, "to observe how much of the past we have been able to construct from this humble and long-neglected material."

The zeal of the learned doctor seems almost to assume a slight character of ferocity when he goes on to declare: "The generations of the past escape our personal investigation, but not our pursuit. We rifle their graves, measure their skulls, and analyze their bones; we carry to our museums the utensils and weapons, the gods and jewels, which sad and loving hands laid beside them; we dig up the foundations of their houses, and cart off the monuments which proud kings set up. Nothing is sacred to us; and yet nothing to us is vile or worthless." If the doctor had wished to quote Horace, he might have said very appositely "*omne sacrum rapiente dextrâ*"; but we should be loath to take him at his word that to the anthropologist nothing is sacred. We believe, on the contrary, that to the true anthropologist the cause of humanity is very sacred; and that it is because an exhaustive knowledge of what man has been and is will, as he considers, greatly advance human well-being, by placing our systems of instruction and all our social arrangements on a more scientific basis, that, in his consuming desire for knowledge, he is prepared even for spoliation.

One of the most important branches or subdivisions of anthropology is ethnology. Its mission, Dr. Brinton says, is "to define the universal in humanity." It aims to define "the influences which the geographical and other environment exercises on the individual, the social group, and the race; and conversely how much in each remains unaltered by these external forces." Like political economy, according to its orthodox professors at least, it has nothing to do with what ought to be; its sole concern is with what is. Ethnology, the doctor asserts with some emphasis, lends no countenance to any absolute doctrine of evolution. He considers that, "taken at its real value, as the provisional and partial result of our observations," that doctrine is a useful guide, but that, "swallowed with unquestioning faith as a final law of the universe," it is no better than the narrowest traditional dogma. At this point we may venture to suggest that the learned doctor is waxing wroth with an imaginary foe, or, if not with an imaginary one, at least with one hardly worthy of his ire. Idle talk about evolution can no more be prevented than idle talk about any other subject, say electricity for example, which some persons believe to be a device, invented probably by Mr. Edison, for getting something out of nothing. No one whose opinion is worth discussing regards evolution otherwise than as a name for the process by which such advancement as the world has hitherto made has been won, and on which we may reasonably depend for further progress in the future, Nature as yet having given no sign that her powers are exhausted or on the point of exhaustion. "The development of humanity as a whole," says Dr. Brinton, "has arisen from the differences of its component parts, its races, nations, tribes. Their specific peculiarities have brought about the struggles which, in the main, have resulted in an advance." Even so, we may hope that in the future, in spite

of a growing equalization of general conditions, those differences which, as Dr. Tylor has well pointed out, will more and more assert themselves in the higher regions of thought and feeling, will lead to a steady advance in human capacity and character.

Anthropology, according to its able advocate and professor, possesses no little skill in dodging the most difficult questions. Having investigated penal laws until it finds their common origin in a desire for vengeance, and having analyzed religions until it discovers that they all spring from a dread of the unknown, it will not follow up either inquiry by attempting to ascertain why men dread the unknown or whether there is any more ultimate form or underlying explanation of the desire for vengeance. In the same way, while noting empirically what has made for the improvement of mankind, it will be careful about grappling with the question as to what "improvement" really means. Perhaps we should not complain of these discreetly imposed limitations, but it seems to us that, as regards the question of human improvement at least, anthropology, with its very wide outlook, ought, above all other sciences, to be in a position to give us its *rationale*.

We are glad to find Dr. Brinton, in the conclusion of his valuable address, declaring that "the teachings of anthropology, whether theoretical or practical, lead us back to the individual as the point of departure and also the goal. The state was made for him, not he for the state; any improvement in the group must start by the improvement of its individual members." We hold that this is the teaching of every true form of social science. The doctrine of individualism is not a doctrine of selfishness; it simply aims at arousing each individual to a sense of his own value as a social unit, and at making him feel that, if he wishes to live in an improved society, he should strive to improve himself and his own immediate environment. The intelligent study of sociology, we have no doubt, will work in this direction, inasmuch as it more and more tends to make all classifications and class distinctions appear unreal, and to bring the individual man into prominence as the one subject and center of its labors. On this ground, if on no other, we would wish it every success; and as there are so many different fields that can be explored in its interest, we would counsel those who have no other scientific occupation to see if they can not bring some offering, however slight, to the great construction which we may hope the leaders of the science will one day give to the world.

RELIGION FOR THE AGE.

Canon Samuel A. Barnett, of England, is a man who has devoted much time and labour to the study of social problems in their widest aspect, and whose writings on such subjects are always marked by active human sympathy allied with strong common sense. We therefore turned at once with interest to his article in the September number of the Contemporary Review to see what he had to say on the subject of The Church's Opportunity, and were not at all surprised to find that he had some very pertinent things to say. In Canon Barnett's opinion "the Church" might, if it could only rise to the level of its duty and privilege, lend most useful assistance to the practical solution of our present-day social problems. How this might, in his opinion at least, be done he clearly indicates. The Church per-

forms three main functions: it provides means of worship, it imparts religious teaching, and it interests itself in charitable work; and what it has to do, according to Canon Barnett, is simply, in each department of its activity, to plant itself at the modern standpoint so as to meet the needs of the men and women of to-day.

In the matter of worship this writer observes that "the words and forms remain the same as those which helped the people of three hundred years ago, although the fashions, the thought, and the whole organization of society have been changed." Cathedrals are little more than "the hunting ground of antiquarians and the practising places of choirs." The Church should "use the art and knowledge of the time as aids to worship." "It might," continues the writer, "by showing the wonders of science, open the eyes of the blind to see something of the height and breadth of the universe"; and the result would be that readier access would be found to men's minds for those sentiments of justice, charity, and mutual forbearance on which the peace and welfare of society must rest. Canon Barnett is quite right when, speaking of the social strugglers of to-day, he says that "conceit, pride in their own methods and aims, restless vanity, selfish anxiety are elements in the present confusion"; nor are we disposed to disagree with him when he says further that "the majority of people think much of themselves, because they are not conscious of One before whom they are as nothing, because, in a word, they do not worship." Here is where the true work of religion comes in, not in opposing the conclusions of science.

"Let science grow from more to more,"

as Tennyson has said,

"But more of reverence in us dwell."

The two are not incompatible, and Canon Barnett seems to feel strongly that it is through neglect of duty on the part of the Church, especially the duty of keeping in touch with the times, that reverence is not more active and influential among men than it is.

Turning to the subject of teaching, this writer is very outspoken. He says in effect that we must find the teaching required by the times in a study of the times. The following quotation will illustrate his meaning: "In the first century slavery was common, and was accepted without question both by Christ and by St. Paul. . . . These teachers, however (the antislavery leaders of the early part of the century), found the spirit behind the words—the Christ of the nineteenth century behind the Christ of the first century. In the name of a contemporary Christ they condemned slavery and convinced their hearers." The reverend gentleman does not observe, as he might have done, that those who appealed merely to the text of Scripture were among the strongest upholders of slavery. The reformers were more or less rationalizers, not pinning their faith to texts, but seeking a spirit and principle of life. The following remarks on religious teaching are much to the point: "Teachers have been too often stewards who bring out only the old things from the treasury, words spoken thousands of years ago, and acts fitted to another age. They go on using a phraseology which is not understood, preaching sermons about dead controversies, and condemning heresies long forgotten. They teach, but the people, tried and troubled by thoughts of duty to the rich or duty to the poor, find no help in their teaching. . . . Bishops might with advantage set candidates for orders to read modern books, and in examination test their powers to observe

the signs of the times. The knowledge of Paley and Pearson might be supplemented, if not supplanted, by some knowledge of the movement of scientific and economic thought during the last fifty years, and proof be given that those offering themselves as teachers 'perceive with their eyes and hear with their ears and understand with their hearts.'"

The canon proceeds to discuss the relation of the Church to charitable work, but what we have already quoted will suffice to show how advanced are his views as to the kind of religious ministrations of which society stands at present in need. He believes, and we agree with him, that the Church occupies a position of exceptional advantage for holding up to men the ideals toward which they ought to strive. Ministers of religion are allowed to *preach*, an exercise in which other men must indulge very sparingly, if at all, on pain of being laughed at. They are supposed to be occupied at all times with the highest and most enduring interests of mankind, and they can adopt a tone of elevation and an accent of earnestness which in all others might seem out of place. Moreover, there is something in human nature which is prepared to respond to their appeals. However conventional or even sordid men may be in their daily lives, however immersed they may be in the all but universal game of grab, they feel that somewhere in their natures is a chord which might vibrate to higher impulses. To put it otherwise, every man knows that there is something in him better than that which he habitually shows to the world or to himself; and it is for the religious teacher above all to awaken that hidden, as Matthew Arnold says, "deep-buried self" into life and activity, to make it assert its authority and power. The rest of us deal with the average man and make our appeal in general to average sentiments: the clergyman, the minister of the gospel, testifies by virtue of his office to the existence of a divine element in human nature, and to him therefore, in dealing with men, all things are or should be possible. What he needs, however, as Canon Barnett so clearly points out, is to be armed with the kind of knowledge which will place him at the modern point of view and make him a true interpreter of the times and of contemporary human nature. Let him use the words of his creeds as far as they will go, and show the soul of truth in antiquated forms and usages; but let him not imagine that human thought can ever be confined within or fully expressed by, any formula or set of formulas: the spirit of life is a spirit of growth and of liberty.

In conclusion, we have only to say that we welcome most cordially such utterances as those of the Anglican canon, not because we suppose that he occupies precisely the point of view that we do, but because we feel that no essential claim of science is antagonized by aught that he advances in the name of religion. He may, for anything we know, hold many special opinions which we do not share; but, if so, these to us are of no consequence beside what we take to be his main and most characteristic belief—namely, that religion is not a fetter for the human intellect, but a garment of beauty for the whole man, and that, without a due recognition of science, no perfect or abiding form of religion can be.

HON. DAVID A. WELLS'S ARTICLES ON TAXATION.

THE editor of the Popular Science Monthly is gratified that he is now able to announce to its readers and the general public, the beginning in

the present number, which opens the forty-eighth volume of the magazine, of the long-promised and anticipated series of articles by Hon. David A. Wells, on the most important subject of taxation.

For the execution of the task which Mr. Wells has assigned to himself, it is acknowledged that he has enjoyed extraordinary advantages; as Chairman of the United States Revenue Commission, 1865–'66 (an instrumentality devised by President Lincoln in anticipation of the close of the war); United States Special Commissioner of Revenue, 1866–'70 (an office specially created by Congress); chairman of a commission for the revision of the tax laws of the State of New York (specially created by its Legislature, 1870–'72, with a view of obtaining Mr. Wells's services); and subsequent membership of important railroad receiverships; of the Arbitration Board of the associated railways of the United States, 1879–'81, and of the Board of Direction of some of the largest manufacturing and insurance companies in the country. The assertion is therefore warranted that to probably no one person, in either the United States or Europe, has greater opportunities been afforded for study of taxation from the basis of practical experience and administration; and while the prediction may not be warranted, that Mr. Wells's conclusions will be accepted finally as solving the vexed and intricate problems involved in the subject, it is certain that the results of his investigations will prove most valuable and intensely interesting contributions to general economic science, and greatly assist in formulating better systems and rules for taxation, especially in the United States, than are now generally accepted.

The editor also feels warranted in saying that the course pursued by Mr. Wells which made his book on Economic Changes one of the most popular and instructive of recent economical publications, will also characterize the new field of inquiry on which he now enters—namely, to marshal in a clear manner and proper order all the facts that seem capable of explaining the situation of vexed and disputed questions, and of thus indicating where and how the truth should be sought for, with the greatest chances of finding it.

Scientific Literature.

SPECIAL BOOKS.

How many evil doers have escaped the just penalties for their acts and what great sums of money have been lost or expended in litigation for lack of an unfailing means of proving personal identity! If the police know that A. B. committed a certain crime and catch a man who they believe is A. B., but who stoutly denies it, they must establish his identity beyond a reasonable doubt in order to secure a conviction. The testimony of acquaintances and even the photographs in the Rogues' Gallery frequently fail to give certainty on this point. There is, however, a set of marks which, in the words of Pudd'nhead Wilson, "every one carries with him from the cradle to the grave" that seem to afford an infallible test. These are the patterns formed by the little ridges on the tips of the fingers. Mr. *Francis*

Galton, whose study of the subject has already extended over seven years, calculates that there is only one chance in 64,000,000,000 of the pattern on any human finger being identical with that on any other. If the patterns of three or four fingers (or the prints from them in printer's ink) be compared, all possibility of error is eliminated, while with a set of prints from the whole ten fingers assurance is made doubly and trebly sure. Mr. Galton has published on various phases of this subject from time to time, and in his latest book* deals with methods of handling large collections of prints so that reference to them may be simple and rapid. It appears that, with a few border-line exceptions, every print may be classified as a loop, a whorl, or an arch. A loop on the forefinger may open toward the ulnar (little finger) or radial (thumb) side of the hand. Loops on other fingers almost always open toward the ulnar side. Where these particulars are not sufficient, minor points, such as the number of ridges from the nucleus to the outside of a loop, and breaks, junctions, or forks of the lines, etc., which an expert can point out to any intelligent person, will be found conclusive. Mr. Galton presents an abstract of the report of a British departmental committee which fully indorses his system, recommending, however, for registering and identifying habitual criminals that a part of the French system of physical measurements be combined with it. The volume contains a specimen directory of three hundred sets of prints and plates in which nearly two hundred impressions are shown. Mr. Galton suggests that finger prints could be employed also for identifying deserters from the army and detecting impersonators of deceased pensioners. This by no means exhausts their possibilities. What an expensive and troublesome litigation could have been saved if a set of finger prints of the real Tichborne heir had been on file when the "claimant" appeared! An important class of life-insurance frauds would be prevented if the companies should require the taking of finger prints as a part of their physical examination, and the abortive attempt of the United States Government to prevent the personation by Chinese immigrants of fellow-countrymen who had been in the United States and gone home could be made effectual by the same means. Mr. Galton has secured abundant official recognition of his system, and the idea is being brought into wide popular cognizance by Mark Twain's story, cited above, and its dramatization.

No happier choice of a writer to tell *The Story of the Plants* could have been made than *Grant Allen*.† He knows what to tell in order to give his readers a satisfactory bird's-eye view of the subject, he has a most attractive way of telling it, and, above all, he knows what to leave untold. His story is not a string of definitions nor an annotated catalogue of genera and species. It tells how plants obtain their food, how they grow, rest, and perpetuate themselves, and what means they take to overcome obstacles and protect themselves from dangers. Something is told also about the way plants lived before there was any one to describe them, and how they came to differ from one another so much as they now do. Although it is thus seen that the physiology of plants is given chief prominence, considerable is told as to their anatomy. Thus, when showing that plants eat

* Finger-print Directories. By Francis Galton, F. R. S. London and New York: Macmillan & Co. Pp. 123, 8vo. Price, $2 (5*s*.).

† The Story of the Plants. By Grant Allen. The Library of Useful Stories. Illustrated. New York: D. Appleton & Co. Pp. 213, 16mo. Price, 40 cents. London: George Newnes, Ltd.

with their leaves, the author describes the chief forms of leaves, but in such a way as to indicate that each form results from an effort of the plant to meet some particular need. Roots are described in the same way. Under the headings How Plants Marry and Various Marriage Customs, the interesting subjects of fertilization and the production of seed are explained. In the chapter What Plants Do for their Young the chief provisions for the dissemination of seeds and the nutrition of the germs within them are described. Some acquaintance with the characteristics of the chief kinds of plants is given under the heading Some Plant Biographies, where whitlow grass, the Mexican agave, the beech tree, the vetch, the coltsfoot, etc., are described. Throughout the book the reasons of things and the adaptation of means to ends are made prominent. The author states that he has "freely admitted the main results of the latest investigations, accepting throughout the evolutionary theory, and making the study of plants a first introduction to the modern principles of heredity, variation, natural selection, and adaptation to the environment." He says further that he will be disappointed if this little book does not lead the reader to pursue the subject in the fields and woods by the aid of a flora. We do not think he will be disappointed.

Is there any limit to the operation of the evolutionary process within the universe as known to us? Is man an exception, and does the popular phrase "lord of creation" mark a real distinction? Mr. *Edmond Kelly** is convinced that man is an exception now, although subject to evolution during the earlier part of his career. Man has developed physically and mentally as other animals have. In a struggle for existence he has shown himself the fittest of all to survive. But now, says Mr. Kelly, this mode of progress has stopped. Under the influence of religion man has developed the faculty of choice and the power of self-restraint, and he is now repressing some of the instincts by which he advanced during his evolutionary period, thereby better fitting himself to live in the social relation. As a member of society he has many grave problems before him, among which Mr. Kelly calls especial attention to municipal misgovernment, pauperism, socialism, and education. Religion is recommended as the guide to be followed in solving them. It might be queried how religion is to remedy the abuses in public affairs that have grown up when religion had a stronger hold upon men than it has now. Mr. Kelly recognises that abuses have grown up under and apparently in connection with religion, but he affirms that theology and various clerical institutions were then dominant rather than real religion. He would by no means bring back the partnership of Church and State where it has been dissolved, but would have religion govern individuals in their performance of social duties. It might be supposed that it would be a matter of indifference to Mr. Kelly whether religion or science were taken as the guide in social affairs, since he takes pains to show that they reach the same goal. Perhaps he could be brought to admit that, in a certain stage of their progress, men are less fitted to follow the guidance of the former than that of the latter. At the present time they are rapidly acquiring the capacity to govern their conduct on scientific principles, but they have so far had great trouble in keep-

* Evolution and Effort. By Edmond Kelly. New York: D. Appleton & Co. Pp. 297, 12mo. Price, $1.25.

ing in touch with their guide when they have attempted to regulate their conduct by religion. Perhaps they may be able to do so in the future, but we think the evolutionary process which Mr. Kelly believes is ended must go on some time longer before man can afford to dispense with the aid which the scientific method gives him.

The bird-loving amateur need be at no loss for guidance. Three manuals adapted to his wants have come to us recently, the latest being a charmingly attractive one entitled *Birdcraft*.* Emerson's query, "Hast thou named all the birds without a gun?" is its motto, and any one who will identify half the species it describes, or verify half it tells about their general appearance, habits, and song, will have occupation enough for several seasons without paying attention to the matters that can be learned only from the dead bird. The sprightliness of the smaller birds makes them delightful subjects of study, their elusiveness adds zest to their pursuit, while the various mental and moral traits indicated by the actions of all kinds well deserve the attention of the psychologist. This instance of the extreme politeness ascribed to the cedar waxwing was observed by the author: "A stout green worm (for they eat animal as well as vegetable food) was passed up and down a row of eight birds; once, twice it went the rounds, until halfway on its third trip it became a wreck and dropped to the ground, so that no one enjoyed it—a commentary, in general, upon useless ceremony." Much pains is taken to represent the songs of the birds described; thus the song of the red-eyed vireo is given in the words of Wilson Flagg as "You see it! you know it! do you hear me? do you believe it?" The bluebird seems to murmur, "Dear, dear, *think* of it, *think* of it!" The Carolina wren cries joyfully, "Sweetheart, sweetheart, sweet!" while there are several versions of the bobolink's rippling song to choose from, and any one may make another to suit his fancy. The song birds by no means monopolize the volume; birds of prey, game birds, shore birds, and waterfowl are all represented by species to be seen in southern New England. Fifteen double-page plates, each bearing from seven to twenty figures of birds in their natural colours, greatly enhance the value of the book.

GENERAL NOTICES.

In *Dr. Kerner's Natural History of Plants*† all the features of the growth, structure, and metamorphoses of vegetation are examined in their relations to one another. Interest was first excited in plants, we are told, by the question of their uses. Other avenues to botanical knowledge have been man's sense of beauty and the impulse to investigate structural differences even down to their most minute characteristics. This has brought the science to its present condition. In addition to these steps, the passion for collecting has been developed. In the later stages of the growth of botany observers have become convinced that every plant undergoes a continuous transformation which follows a definite course, and every species is constructed on a plan fixed within general limits and exhibiting variation in externals only. The systematic arrangement that has grown out of the application of these principles starts with the idea that rather than by similarity between adult forms the relationships of different plants are more correctly indicated by the fact of their exhibiting the same laws of growth

* Birdcraft. By Mabel Osgood Wright. Illustrated. New York and London: Macmillan & Co. Pp. 317, small 8vo. Price, $3 net.

† The Natural History of Plants. From the German of Anton Kerner von Marilaun. By F. W. Oliver. New York: Henry Holt & Co. Half Volumes I and II. Pp. 777. Price, $7.50. London: Blackie & Son. Price, 25*s.* net.

and the same phenomena of reproduction. As the beginning of the plants and of the study of them we are told of the living principle in them, represented by the protoplasts, which are considered as the seat of life, and of their movements, secretions, and constructive activity, and their communication with one another and with the outer world. The next steps are the absorption of nutriment from inorganic substances and organic and the changes it produces in the soil; the conduction of food; and the formation of organic matter from the absorbed inorganic food, with the functions of chlorophyll and the green leaves. Metabolism and the transport of materials are considered with reference to the organic compounds in plants, the transport of substances in living plants, and the propelling forces in the conversion and distribution of materials. Under the heading of the Growth and Construction of Plants are included the Theory of Growth, Growth and Heat, and the Ultimate Structure of Plants. The last chapter of the present volume relates to plant forms as completed structures, and in it are discussed the progressive stages in complexity of structure from unicellular plants to plant bodies and the forms of leaf, stem, and root structures. The volume concludes with the observation that the just pride and satisfaction we may have in what we have gained in the knowledge of plants "must not blind us to the recognition of the fact that most questions concerning the life of plants are as yet only at the commencement of their solution." The work is illustrated by about one thousand original wood-cuts and sixteen plates in oil colors.

*Menschutkin's Analytical Chemistry** is a college manual embracing both qualitative and quantitative analysis. Its most distinctive feature is the care that the author has taken to make the student understand the reasons for what he is doing. In the qualitative determination of metals the corresponding compounds of all the metals of a group are studied, and the conditions necessary for the separation of one group from another are deduced (General Reactions), after which the behavior of the compounds relied upon for detecting single metals (Special Reactions) is considered. A systematic course of analysis for the group in hand follows. With the metalloids, on the contrary, the special reactions of these elements and their compounds are first considered, and the student then passes to the complicated methods required for detecting the elements when occurring together. In the quantitative part the chief methods of gravimetric and volumetric analysis and the analysis of organic compounds are set forth. Here the author has followed also, so far as practicable, the procedure employed in the qualitative part.

It is generally accepted now that all life originated in the sea, and very probably in the littoral or coast region. The constantly varying conditions here, due to the surf and the tides, doubtless had a large share in determining form and structure; the violence of the surf beating its inhabitants to death, and the retreat of the tide exposing them to the attacks of predatory birds and beasts and to new atmospheric conditions. Hence in all probability have originated the various forms of adaptation which are calculated to bring about the survival of the fittest. The widespread effect of these factors in shaping present forms lends a special interest to the study of the littoral life of to-day. The general plan of classification in the work before us* is not that of any single authority. The authors have adopted the views of the leading specialists in the various groups. While this has the advantage of placing before the student the results of recent investigation, it occasions a certain number of discrepancies where the departments overlap, which are likely to lead to confusion. Up to recent times the mollusca have been regarded as one of the four subdivisions of the great family *Malacozoa*. The progress of investigation, however, tends to the belief that the mollusca are not so closely related to these groups as such a classification implies. The authors think that any attempt definitely to relate them to one group or another is to go

* Analytical Chemistry. By N. Menschutkin. Translated by James Locke. London and New York: Macmillan & Co. Pp. 512, 8vo. Price, $4 net.

* Mollusks and Recent and Fossil Brachiopods. Vol. III of the Cambridge Natural History. By A. H. Cooke, A. E. Shipley, and F. R. C. Reed. London and New York: Macmillan & Co. Pp. 535. Price, $2.60.

further than the present state of our knowledge warrants. The group Brachiopoda owes its chief interest to the immense variety and great antiquity of its fossil forms. There are at the present time only about one hundred and twenty extant species. The study of the mollusca occupies 460 pages, the remainder of the work being devoted to the brachiopods. The book is intended apparently as a student's manual. The description is clearly written and contains considerable historical narrative and many good illustrations.

Mr. Clodd justifies his *Primer of Evolution*,* an abridgment of his Story of Creation, by the reception which the larger work received, and the necessity for putting the material into a condensed and inexpensive form in order to reach the general reader. The first portion is descriptive: matter and motion, from the philosophical standpoint; the distribution of matter and the solar system; and finally two long chapters on the past life history of the earth and present life forms, compose Part I. Part II, the explanatory portion, has chapters on the becoming and growth of the universe, the origin of life and life forms, on the origin of species, and social evolution. The book is written in a popular style, and seems an improvement on its more bulky predecessor.

The high disciplinary value of the study of psychology, which gives a scientific basis to education and lifts it out of empiricism, is distinctly shown in the volume before us.† The authors have pointed out, in a very interesting manner, the application of psychology to number. They say that the teacher who knows how the mind works in the construction of number is prepared to help the child to *think* number. They take the position that the normal activity of the mind in constructing number is highly pleasurable. This is confirmed by actual experience and observation of facts in child-life. There are few children who do not delight in counting, and the fact should be taken advantage of by instructors. A sympathetic and competent teacher can interest them so keenly that apparently wonderful results may be obtained with but little difficulty.

The authors speak of how an absolute distaste for number is created by faulty methods of teaching, with arrested development as a natural result. They say it is perhaps not too much to affirm that nine tenths of those who dislike arithmetic, or who at least feel that they have no aptitude for mathematics, owe this misfortune to wrong teaching at first. The teacher can readily learn from an intelligent study how to make the work of the schoolroom consistent with the method under which by Nature's teaching the child has already secured some development of the number activity. Beginning with a group, counting, parting, and wholing are all in harmony with Nature's method, which "promotes the natural exercise of mental function and leads gradually but with ease and certainty to true ideas of number. It minimizes the difficulty with which multiplication and division have hitherto been attended, and helps the child to recognize in the dreaded *terra incognita* of fractions a pleasant and familiar land."

The authors' remarks concerning kindergarten work are sound and are based upon results that are evident to all. There is a sure and pleasurable way, along the line of least resistance, that may be followed in the kindergarten, with great improvement in the method of preparation for a child's work later. The authors say: "Surely something is lacking, either in the kindergarten as a preparation for the primary school or in the primary school as a continuation of the kindergarten, when a child after full training in the kindergarten, together with three years' work in the primary school, is considered able to undertake nothing beyond the 'number twenty.'" They add that under rational and pleasurable training of the number instinct in the kindergarten the child ought to be arithmetically strong enough to make immediate acquaintance with the number twenty, and rapidly acquire, if he has not already acquired, a working conception of much larger numbers.

In the easiest possible manner the authors go on to explain every process of number, and the presentation is such as to interest any one impressed with the necessity of a

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* A Primer of Evolution. By Edward Clodd. London and New York: Longmans, Green & Co. Pp. 186. Price, 75 cents.

† Psychology of Number. By Dr. J. A. McClellan and Prof. John Dewey. International Education Series. New York: D. Appleton & Co. Pp. 309, 12mo. Price, $1.50.

sound basis for education, but more particularly those instructors to whom we look for guidance—from kindergarten to college.

Mr. *Frank Sargent Hoffmann's* book on *The Sphere of the State** is the substance, chiefly, of lectures delivered before the senior class of Union College in 1893, and is intended to set forth clearly and concisely the ethical principles involved in the rights and action of the state, and to show how they may be applied under present conditions and principles. In the author's view the state is the primal and universal unit of society; it is coextensive with the human race, and is independent of the existence of nations, and every man is born into it. It is manifold, for many distinct divisions of mankind called states may exist at any given period. The supreme control of all persons and commodities must be with it, and there can never be an individual right to anything in the state that is not subordinate to its right. Dismissing such conceptions as base the organization and extent of the state on geography, race, family relation, language, or religion, the author accepts that which founds it on brotherhood and the needs thereof, and makes the chief and ultimate end of the state, to which all other ends must be subordinate, the perfection of the brotherhood; and all this, the state, the entity, is distinguished from the government, which is only an instrument. The state's first duty is to enlighten its members respecting their ever-varying relations, and what they require—education. While the true and distinctive ground of property is labour, by which it is acquired, and that is performed by individuals, the natural right to property is ultimately resolved into a state right, and the individual's right must in the end be controlled by the needs of the state or the good of the whole brotherhood; and "only from the conception of property as ultimately owned and controlled by the state can we come to a true conception of the property right of each citizen of the state." The principles thus laid down are followed out in their application to the various functions and features of civic and social life; to the creation of corporations and the assigning them their places in the state; to the matter of transportation and its relation to the state; to taxation, the right to impose which belongs only to the state as a whole and is absolute there, but not to any individual; to questions of money; to the treatment of criminals; to relations with the poor; to the government of cities, the family, the Church, and relations with other states. The author's reasoning is profound and comprehensive, his tone is conservative, and the book is full of thought.

Of all the leaders in the late war for the preservation of the Union, General Sheridan* probably comes nearest among the Unionist commanders to fulfilling the popular ideal of a hero. Brave, alert, often brilliant, and nearly always successful, he acquired his full measure of glory while in active service, while nothing happened in his after-life to dim his renown. His biographer was fortunate in his subject. We may say that the subject is as fortunate in its biographer. General Davies served with distinction in the cavalry corps of the Army of the Potomac under General Sheridan from September, 1863, till the end of the war, and his brigade was present in all Sheridan's battles. It was mainly for this reason that he was chosen by the editor of this series to be Sheridan's biographer. He was an officer of correct military information and was, as his narrative proves, a writer with clear perception of what should go into a biography, and was able to estimate correctly the value of each action and to describe his hero justly and without exaggeration or extravagance. He died one month after he had completed this book. He regards General Sheridan as having possessed to an eminent degree the most indispensable qualities of a commander. "He had the ability to think and act promptly and energetically, and, if need were, independently of instructions, and to assume and support with ease whatever responsibilities his situation might require; he had the power to impress his will and personal influence

* The Sphere of the State, or the People as a Body Politic; with Special Consideration of Certain Present Problems. By Frank Sargent Hoffmann. New York and London: G. P. Putnam's Sons, pp. 275.

* Great Commanders: General Sheridan. By General Henry E. Davies. With Portrait and Maps. New York: D. Appleton & Co. Pp. 332. Price, $1.50.

upon all who were under his command." He was not a martinet or a rigid disciplinarian, but exacted implicit obedience from his subordinates and a prompt and energetic performance of duty. He also recognized the reciprocal relations that should exist between a commander and his troops. Great stress has been laid by some writers upon his "dash," but no estimate of his character could be more erroneous than that which made him only a hard-riding, hard-fighting, and reckless soldier, whose fame and success were due to desperate personal courage and impulsive combativeness, with exceptional good fortune. He had energy and dash, and, added to these, judgment, patience, industry, and full knowledge of all the duties of a commander and a soldier, and deserved all the distinction he won.

The *Annual Report of the New York State Board of Charities* for 1894, a bulky volume of 576 pages, is a valuable compilation of statistics relating to the charitable institutions and other charities of the State. The total expenditure of the State charities department for the year ending September 30, 1894, was $3,877,709.80; of county and city institutions, $3,872,985.50; and of private and incorporated societies and associations, $13,231,698.52. This was a total increase over 1893 of $574,410.88.

The Teacher's Mentor (Bardeen, 50 cents) is written to aid the inexperience and guide the uncertainty regarding practical details of the beginner who is without special training. It is, the author says, based on what he now sees would have been useful to him in his early years of teaching. Among the topics considered are, the outfit for teaching, including knowledge of subjects to be taught and general information desirable; necessity for understanding the children; what education is; relations between teacher and trustee; desirability of producing a good first impression on the children; and school routine in detail.

The studies on which *Le Pétrole, l'Asphalte, et le Bitumen* (Petroleum, Asphalt, and Bitumen), of the late Prof. *A. Jaggard*, of Neufchâtel, is based, were begun in the Jura and the asphalt bed of the Val-de Travers, and were stimulated by the discovery of mineral oil in the United States. Their purpose was to investigate the origin of the natural hydrocarbons. The various theories of petroleum are criticised, the mode of its formation is discussed, the discoveries of beds of it in the Old and New Worlds are described; and bitumen and asphalt are similarly treated. The author concludes that no extraordinary processes or forces are needed to account for the production of these substances, but that it is still going on in the usual course of events, by a kind of natural, slow distillation of organic matter. But in studying the beds it is necessary to discriminate between the original formation of the substances and the displacements which they may have undergone afterward, and which may have had much to do in bringing them into their present position. The book is published by Félix Alcan, Paris, as a number of the French International Scientific Series.

In a similar line, though the starting-point is different, is *Les Merveilles de la Flore Primitive* (Wonders of the Primitive Flora) of M. A. Froment, which is published by Georg & Co., at Geneva and at Paris. It begins with a minute study of the carboniferous vegetation, its structure and forms, and proceeds to the discussion of the way in which the coal-forming plants may have been accumulated and converted into coal. This is done by gradual, unheated distillation, which, under certain other conditions, produces the hydrocarbons. A preponderant function is ascribed to electricity in the production of the coal plants. This well-reasoned essay is followed by a remarkable speculation over what may have happened if Australia fell upon the earth as a meteoric mass.

In obedience to an act of Congress, the *Commissioner of Labor* has made an investigation and a report on *The Slums of Baltimore, Chicago, New York, and Philadelphia.* The report embraces thirty-three tables, in which are given under various classifications the color or race, country of birth, citizenship, illiteracy, occupations, weekly earnings, number of children, bodily condition, etc., of the inhabitants of the districts examined, also the school attendance of their children, the number of families to a tenement, air space to a person, rent paid, and sanitary condition of the tenements. From an analysis of the tables it appears that the slums, as compared with other parts of the cities in which they are, have a larger proportion of

foreign-born denizens; sickness does not prevail in them to any greater extent, and most of the bacteria found in the air of the tenements are harmless; the occupations of the slum population are as varied as those followed in other districts, and their earnings are "quite up to the average earnings of the people generally and at large." But few tenements could be reported as in excellent sanitary condition; in Philadelphia and Baltimore those classed as good formed the largest division, while in New York and Chicago those reported as fair were the largest class. Cases of overcrowding were numerous.

Part XXVII of the *Proceedings of the Society for Psychical Research* opens with an account of some experiments in thought transference, by *Henry G. Rawson*, in which drawings were reproduced and cards were named correctly in a large proportion of cases. The chief contribution in the number is a second installment of the experiences of the late W. Stainton Moses, communicated by F. W. H. Myers. These experiences are what are commonly known as spiritual communications. There is also a paper on the Apparent Sources of Subliminal Messages, and reviews of books on hypnotism, the exposure of Mme. Blavatsky, and other psychical subjects.

In *The Coming Revolution* (Boston, Arena Publishing Company) the position is assumed by *Henry L. Call* that the prevailing discontent among the "toiling masses" is a sign that the present conditions of society and the relations of the rich and the wage workers are all wrong and a revulsion is imminent. The author accordingly begins his diagnosis with an examination into the condition of society, and follows it up with inquiries into the causes that have produced that condition; the nature of these causes, and whether they rightfully admit of a remedy and its justification; the application of the remedy to each of the causes in turn; the effects of the remedy; and the manner in which it is to be achieved. The causes of the trouble are abuses of privilege of a political nature and origin. The remedy is to enforce the law of freedom—of social and industrial as well as political freedom; and it is to be secured by political means.

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Fragments of Science.

Nature's Defenses against Disease.—It is maintained by Dr. C. Theodore Williams, of the Hospital for Consumptives, Brompton, England, that in most of the specific modes of treating consumption, particularly in the antiseptic modes, the greatest factor of all—the resisting power of the organism to disease—is ignored, and that it is to this that the physician should lend his aid and support. For if his means are effectual he can ward off disease, or if a patient has been already attacked he can limit its inroads and possibly arrest it altogether. The history of the treatment of phthisis shows that life in the pure air, judicious exercise, light, nourishing dietary, and such aids as cod-liver oil and tonics have effected more than all the bacillicide treatment put together. These all act on the old principle of helping Nature to help herself and reducing the vulnerability of the patient to attack. The weapons of resistance which Nature lends the human body are the leucocytes or phagocytes, studied by Metchnikoff, which absorb the bacilli and destroy their energy. Another destroyer of bacilli is the serum of certain animals; and a third method of destruction is seen in the process of fibrosis, which is largely present in chronic consumption. In a well-organized, well-developed, and therefore well-protected person the bacilli are overwhelmed by the irruption of phagocytes at the point of entry, and immunity is the result. In one of less protective power they may enter and be carried along by the lymphatics to the lymphatic glands, where they undergo digestion and destruction. When, however, the tubercle bacilli gain an entrance, and settle, and destroy the tissues, as in the case of the lung, the most that can be hoped for is that the progress may be obstructed by fibrous growth, or that, through developing and expanding the healthy lung in the neighborhood, pressure may be brought to bear on the diseased portion, inducing a drying process incompatible with the life of bacilli. This process is encouraged by living at high altitudes. The problem of treatment resolves itself principally into means to increase the number and activity of the phagocytes and thus render more probable the destruction of the tubercle bacilli. Moreover, whatever improves the quality of the phagocytes would also improve and enrich the blood and lymph serum, of which they form a principal part. To this quality the author attributes the virtue of cod-liver oil—to which he has found, he says, no substitute comparable. Sunshine and pure air are the best bacillicides. At Davos and St. Moritz phthisical patients almost invariably sleep with open windows throughout the winter, when the thermometer not uncommonly registers —4° F., or 36° below the freezing point, care, of course, being taken to heat the room with stoves, to provide plenty of blankets and coverlets, and to see that the current of external air is not directed on to the patient,

but always first ascends to the ceiling. The universal testimony of medical men is to the effect that no harm, and much good, results from this practice. One effect is that patients accustom themselves to living at a lower temperature without noticing it. At Davos, Leysin, and Falkenstein there are covered terraces or long, sheltered corridors, open on one side to the air and protected from wind, where a large number of phthisical patients in various stages of disease recline on couches for the greatest part of the day in all weathers. In the winter there is no heating apparatus, and warmth is kept up by fur clothing and abundant covering.

Requisites of a Public Museum.—"If public libraries, why not public museums?" asked Prof. E. S. Morse in the Atlantic Monthly a year ago. Having discussed the subject in a general way, he comes to the application: "First and foremost, then, the town museum should illustrate the natural products of the immediate region. By natural products is meant, of course, the animals, plants, rocks, and minerals found in the county, or possibly in the State; for a county collection would require but a few extralimital forms to compass the State. Second, a general collection of similar material from elsewhere, to show the relation of the county to the rest of the world. Anatomical, physiological, and morphological series should next find place in such a museum. The minor factors of natural selection, such as protective, alluring, and warning coloration, mimicry, etc., should be illustrated, as far as possible, from collections made in the immediate neighborhood. And, finally, a series of forms to show the phylogenetic development of the animal kingdom should in some way be given. Such a series would require large floor space, and the solution of many perplexing problems as to form of cases and methods of display. Yet a scheme of this sort must ultimately be devised." Such an idea has been attained in part by the Peabody Academy of Science in Salem, the collections of which comprise, first, a remarkable series of the animals and plants, rocks, minerals, and archæological specimens collected in the county of Essex, which are continually increasing as new forms are added; an epitome collection of the animal kingdom, brought from all parts of the world; and an ethnological collection, arranged by countries. These collections are all fully and clearly labeled. At close intervals throughout the entire collection special colored labels are displayed, calling attention by title and shelf number to books in the public library referring to the immediate groups. Courses of lectures are given in the Academy Hall every year, which are practically free to the public.

Life in Balochistan.—An interesting lecture on the northern Balochis, a hill tribe of Balochistan on the northwestern frontier of India, was recently read before the Indian Section of the Society of Arts by Mr. Oswald U. Yates, a gentleman who, while engaged in Government work, spent seventeen years in the neighborhood of these people and gave much of his time to a study of their language, history, and customs. The Balochis are Mohammedans, but not very assiduous votaries; none have been converted to Christianity, however. They are probably a mixture of Kurd and Arab. Their language is quite similar to Persian—so much so that Pottinger, who visited Balochistan in 1830, and who was familiar with Persian, could after a few weeks understand most of what was said to him. In order to be a respected citizen, a Balochi must have long, curly black hair, the longer the better; and a long beard is also considered desirable. They are very superstitious. On certain days they believe it is bad luck to go in certain directions; they are guided in this by a rhyme, which translated is:

"On the 1st and 11th I will not go east.
On the 5th and 15th I will not go west.
On the 3d and 13th I will not go south.
On the 7th and 17th I will not go north."

They augur coming events from an examination of the lines on the shoulder blade of a newly killed goat. Goats are also made use of in discovering the sites of disused wells, this, however, is not peculiar to the Balochis. Their method of irrigating is rather unique. "Before the commencement of the rains, the fields are inclosed by lofty embankments, varying in height from three to ten feet, and inside these banks (called *lathandi*) the water from the hill torrents is admitted; when one is full the next is filled.

The banks are made by bullocks; a board about eighteen inches long and twelve inches broad is attached to a pair of bullocks, who drag it, along almost vertically until a heap of earth is raised in front of it; this board is then thrown flat by means of a cord and dragged on to the bank, with the earth on top of it and there its load is deposited. As soon as the water has sunk into the ground plowing commences, and the seed is sown"; millet is the chief crop. They kill all male colts as soon as they are born. "The reason for killing them is that they can not be taken on marauding expeditions owing to their neighing on seeing a mare." They use the Persian saddle and are very good horsemen. Adultery is punished by the death of both man and woman. They firmly believe in the ordeal by fire. One of the most trying of their tests is the following: In a large vessel filled with scalding hot water are placed two stones of different colors; one of these stones, unknown to the supposed criminal, has been labeled the guilty-stone. In order to establish his innocence he has not only got to choose the other stone, but also remove it from the boiling water by using his naked hand and arm.

The Care of Milk.—The composition of milk admirably adapts it to the growth of all kinds of bacteria; this growth causes in it undesirable chemical changes. As secreted in a healthy animal milk contains no micro-organisms of a dangerous character; but during and subsequent to the process of milking its contamination is inevitable. Various forms of disease—consumption, typhoid and scarlet fevers, diphtheria, etc.—have been in numerous instances traced to an infected milk supply, and it is unquestionable that much of the stomach and intestinal trouble so fatal to young children during the summer months is caused by unhygienic milk. It is plain, therefore, that the elimination of living germs from milk is quite essential to its safe use as a food, especially for infants. The most scrupulous cleanliness has been found inadequate; hence some artificial process becomes necessary. There are two methods in common use, pasteurization and sterilization. The former heats the milk to about 160° F., and the latter to over 212° F. The pasteurizing process, while not quite so thorough, kills any growing bacteria that may be present, and has the advantage over sterilization, of leaving the physical condition and flavor of the milk practically unchanged. A method of pasteurization for family use is as follows: "1. Use only fresh milk (not more than twelve hours old) for this purpose. 2. Place the milk in clean bottles or fruit cans, filling to a uniform level. (If pint and quart cans are used at the same time, an inverted dish or piece of wood will equalize the level.) Set these in a flat-bottomed tin pail and fill with warm water to same level as milk. An inverted pie tin punched with holes will serve as a stand on which to place the bottles during the heating process. 3. Heat water in pail until the temperature reaches 160° F.; then remove from fire, cover with a cloth or tin cover, and allow the whole to stand for half an hour. 4. Remove bottles of milk and cool them as rapidly as possible without danger to bottles, and store in a refrigerator." The following suggestions to buyers of commercially sterilized milk are worthy of note: "1. Label on bottle should show that the material was pasteurized not more than one day previous to delivery. 2. Shake the bottle thoroughly before opening, so as to remix the contents as much as possible. 3. The paper disk should not be replaced after it is once removed. Invert over neck of the bottle a clean, dry tumbler or glass to prevent anything from falling into the bottle. 4. Any unused milk or cream that has been put in another vessel should not be poured back into original bottle again. 5. Keep the original bottle in the coldest part of the refrigerator as much as possible. When so treated, properly pasteurized cream or milk ought to keep perfectly sweet for several (two to four) days, even in the height of the summer season."

Improvement of Crops.—In presenting a new theory respecting the improvement of crops, J. C. Arthur propounds as fundamental, interacting principles, that a decrease in nutrition during the period of growth of an organism favors the development of the reproductive parts at the expense of the vegetative parts. The converse, that an increase in nutrition favors the vegetative parts at the expense of the reproductive parts, is also

equally true, and that as a general law large seeds produce stronger plants with a greater capacity for reproduction than small seeds of the same kind. In the economy of Nature, as the food supply is lessened, a greater effort is made on behalf of the parent plants to enhance the chances for perpetuity, but at the same time the largest seeds, having the greatest potentiality, stand the best chance in the future struggle, and, although the best, nourished plants produce the fewest seeds, their greater size gives them decided advantages over seeds from starved plants. The two laws acting together, therefore, aid in maintaining the perpetuity of the species and its full measure of vigor. The two categories of methods for the improvement of crops are the enrichment and cultivation of the soil and the selection of seed, especially of large seed. It is desirable to know that intensive farming will give a better return in all crops grown for fodder, or for the roots, or other portions of the vegetative part of plants, than in those grown for grain and fruit. In either case, but more especially in the latter, the highest vigor and best returns can be obtained only by the use of the best and heaviest seed. When this is done high tillage will increase the yield and make possible the greater improvement of succeeding crops.

Happiness of Animals.—"What makes the happiness of wild animals?" asks a writer in the London Spectator. What the happiness of wild creatures consists in, he continues, "can perhaps be best judged by their daily habits. Within certain limits they are free to choose their life, and presumably they choose what pleases them best. In nearly every case this is one of pure routine. It consists in a daily repetition of a limited series of actions, the greater number of which seem to give them satisfaction rather than pleasure, but make up in the aggregate the sum of animal happiness. Unlike the domestic dog, which welcomes any break in the monotony of life, they never, except in the courting season, seem to seek change, or adventure, or excitement. It may be doubted whether, if the food supply were plentiful and constant, animals or birds would ever care to move beyond the circle in which they can find enough for their daily wants. The probable whereabouts of deer at any time in the twenty-four hours, and their occupation, whether feeding, sleeping, or resting, are known with the utmost certainty by those whose business it is to watch the forest, and could be predicted for any month in the year. . . . The adventurous life, if it is found anywhere among wild creatures, belongs to the carnivorous animals. Yet most of these only wander just so far as is necessary to find their prey, and then prefer to kill some creature that will provide a meal for more than one day. They are naturally indolent, and active only from necessity." Even lack of space is not a serious drawback to the happiness of most animals at the London "Zoo." "The lions and tigers feel the confinement of their inner cages and often strike impatiently at the doors which separate them in winter from their summer palaces, and the wild cattle would enjoy life far more if a roomy paddock could be added to their pens. No hawks or eagles can be happy in cages, because exercise in flight is essential to their health. Parrots, on the other hand, dislike exercise, and consequently live to the greatest age of any creatures in the gardens. Bears seem to share this dislike for unnecessary movements, and 'my lords the elephants,' and all the camels, with true Oriental indifference, would prefer to stand all day doing nothing, if they were not compelled to earn their living by carrying visitors. All the reptiles lead the life of lotus-eaters, and, so far as their brief day lasts, the tropical butterflies in their cages seem equally happy with those which flit among the flowers that line the garden walks."

Picturesque Arctic Nature.—How small, says Julius von Payer, is the matter for artistic reproduction in the old civilized world compared with the rest of the globe! "Has the desert been depicted in such a manner as it undoubtedly deserves to be? Or the Tundra, the primeval forest of the Dark Continent, the swampy shores of Lake Chad, the bridle-path of the Cordilleras, the Tibetan mountain lake, or the coral islands? What of the animal world, if we except our domestic animals and some wild game: the Indian beasts of prey; the African pachyderms; the troops of monkeys or tortoises of Brazil? And then the scenes of human

activity: the negro battles; the dreamy, still life of the South Sea islanders; the buffalo hunters; Yakuts so hardened as to sleep almost naked in the snow; India-rubber collectors on the Amazons; Patagonian giants; Niam Niam dwarfs, etc." The author especially commends the polar regions as artistically attractive, where great effects are produced with little color by the varying charms of light conferring life upon even the most monotonous views. In the four years and a half he spent there he was ever charmed by the change in pictures of Nature. "What a magic spell, for instance, is produced even by the twilight, . . . the time without bright light, almost without shade; that of soft, dreamy silhouettes, of the clear green sky, and the pale, silvery tone of the mountains! The snow is now melted, and the blue sea-ice lies bare, scarcely tinged with red by the setting sun. Even the long winter night possesses its artistic charm from the midday arch of light, or the moon, which changes the channels beneath into rivers of silver. The arctic sky alone would enrapture the painter. As the returning sun nears the horizon, every color glows forth, a border of light dividing the part of the atmosphere still in the shadow of the earth from that already lighted up." Then there are the infinitely varied phenomena of refraction, with *Fata Morgana*, giving the most curiously odd and unlike appearances to various objects; vapor effects; the ice blink; variations of snow and bare ground; pastures with reindeer and musk oxen; and vegetation, for, "although there is never the thick flora of our meadows, yet one meets with limited areas either yellow with *Papava nudicaule* or *Ranunculus*, or carmine with *Silene* or *Saxifraga*, or blue with forget-me-not, or white with *Crastium*. East Greenland has its huge Kaiser Franz Josef fiord, surpassing the fiord of Norway, and the whole of Greenland furnishes surpassing mountain landscapes; Spitzbergen has a profile like a saw; and Novaya Zemlya is a table land, buttressed by mountain cones."

Forest Protection in the United States.—In a paper published in the Proceedings of the American Forestry Association, Mr. George H. Parsons, of Colorado Springs, shows that measures for the protection of forests were taken by some of the colonies as early as in the seventeenth century. These provisions were continued everywhere after the formal organization of the Government of the United States, and now each State and Territory has some law, providing more or less severe punishment to any person setting fire to woodland or prairie. But as it is very difficult to find the offender, or to convict him afterward, laws of this class are operative, if at all, by their threat rather than by their execution, and with few exceptions have become dead letters. The only States said to be comparatively free from forest fires are Maine and Massachusetts, and especially New York, whose forest commissioner reports that they are now a thing of the past. Laws encouraging the planting and growing of timber and shade trees are found on the statutes of twenty-two States and Territories, having been adopted more generally in the prairie States. They have been the means of covering with trees thousands of acres, and have driven the prairies many miles westward. Kansas is credited with the largest area planted with forest trees, and Nebraska comes next. These laws have done much good, but, after all, tree-planting along roadsides, and in small, isolated clumps, is not forestry, and legislation of this kind, though indirectly aiding the cause in an educational way, does not preserve or create forests. In the same direction of education is the appointment of Arbor Day, which has become a legal holiday in thirty States and Territories. Being celebrated in the public schools, it is made a most important factor in creating an interest in trees and a knowledge of plant life among people at their most impressionable age. Regular forest commissioners or commissions have been appointed in ten States. They began work actively and enthusiastically, but it is now a question whether they are able to do much good. Politics is gnawing their vitals out.

A Volcanic Dust Deposit in Kansas.—A large deposit of volcanic dust is described in Science by H. J. Harney as existing in central Kansas, in McPherson County, north of the watershed between the Smoky Hill and Little Arkansas, and in the great depression extending from Salina to the Little Arkansas.

The exposure is about fifteen miles long, from two to four feet thick, from forty to fifty feet high, rests on a bed of clay, and is overlaid by a bed of yellow marl. At the lowest point the dust is well assorted and stratified; at the higher points it shows signs of having been deposited in shallow water. It is composed chiefly of silica, with small proportions of ferric and aluminum oxides, protoxide of manganese, water, lime, and traces of other substances. The microscope shows it as consisting almost wholly of microscopic, transparent, silicious flakes of various irregular forms.

Geological Society of America.—The seventh summer meeting of the Geological Society of America was held at Springfield, Mass., Prof. N. S. Shaler presiding. A paper was read by C. H. Hitchcock on the Champlain Glacial Epoch, which was regarded as corresponding with Prof. James Geikie's Mecklenbergian Epoch. In a paper on the Glacial Genesee Lakes, H. L. Fairchild exhibited the relations of the Genesee River drainage basin to surrounding river systems, and endeavoured to determine the glacial history of the region. In his paper on the Bearing of Physiography on Uniformitarianism, W. M. Davis maintained that the success in the interpretation of Nature by means of the physiographic study of land forms confirmed the correctness of the postulates of uniformitarianism and brought to its support a series of facts not in the beginning of the study supposed to bear upon it. J. C. Branner described the decomposition of rocks going on in Brazil as being more profound there than in temperate regions. The chief mechanical agency promoting it is the daily change of temperature to which rocks exposed to the sun are subject, which causes exfoliation and the admission of a number of destructive agencies and reactions. Among these agencies are rain, bringing down corroding acids, insects, and plants. Many papers of more special interest were read on subjects of stratigraphical, glacial, and economical geology, and paleontology. A committee which had been appointed in 1893 to secure the expropriation of the region about Mount Rainier as a public park reported that it had presented the case to a committee of the United States Senate, but had failed to have a bill recommended. The committee was continued, to make another effort.

The French Scientific Association.—The French Association for the Advancement of Science met for 1895 in Bordeaux, where its first meeting was held in 1872. The *maire*, in welcoming the association, referred to the changes which had taken place in the city since then—all for good, and largely for the diffusion of knowledge and the promotion of public comfort. The number of primary schools had been tripled; the Lyceum, in whose halls the sectional meetings were held, had been built, and faculties of law, science, letters, and medicine and pharmacy had been established and an observatory erected; all attracting an attendance of more than two thousand students, and giving the place all the privileges of a university except the name. Museums also and art galleries had been founded, and benevolent institutions brought into existence. All these, the *maire* intimated, were the results of the scientific activity which began with the meeting of 1872. The president, M. Émile Trélat, took salubrity as the subject of his address, in which he gave a felicitous description of the ideal city of health. The work of the previous meeting of the association, which was held at Caen, and the history of the association during the year, were reviewed by the secretary, M. Livon. The association lost many of its distinguished members during the year, among whom were Baron Adolphe d'Eichthal, one of the founders, a benefactor, and president in 1875 at Nantes; Verneuil, the eminent doctor, president in 1885 at Grenoble; Gustave Cotteau, several times president of the Geological Section; Alphonse Guérin, Ferdinand de Lesseps, Recipen, and Armand Lalande, founders; Victor Duruy, and others; and among the foreign associates the Russian mathematician Tchebichef and Carl Vogt, who had attended a number of the meetings. It appears from the financial reports presented by M. Émile Galante, treasurer, that the year's receipts of the association were 86,244 francs.

Infectiousness of Milk.—The Massachusetts Society for Promoting Agriculture has issued a report of work done under its auspices on the above subject. It being already

well established that there was much danger of the milk being contaminated if the cow from which it came had tuberculosis of the udder, attention was restricted to the question whether the milk was ever infected when the disease was confined to other parts of the animal. Bacilli were found in the milk from twelve out of thirty-six tuberculous cows. Milk from six out of fifteen infected cows produced bacilli when inoculated into guinea-pigs, and the milk of four out of nineteen cows produced bacilli in rabbits. Bacilli developed in two out of forty-eight rabbits, five out of twelve pigs, and eight out of twenty-one calves to which milk from tuberculous cows was fed. It is interesting to note that microscopic examination revealed bacilli in only one out of thirty-three samples of milk ordinarily supplied to consumers in Boston, but bacilli appeared in rabbits after inoculation with three of the samples which gave negative results under the microscope. A circular sent to eighteen hundred physicians and veterinarians asking "Have you ever seen a case of tuberculosis which it seemed possible to you to trace to a milk supply as a cause?" brought replies from one thousand and thirteen, eight of whom reported cases where they believed children had been infected by mother's milk, and eleven reported cases in which children had been infected by cow's milk, while sixteen spoke of suspicious cases which they had not been able to verify. Some results of inquiries as to the prevalence of bovine tuberculosis and as to tuberculosis among Hebrews are also given.

Extermination of British Species.—In the inaugural address of the president of the Cheltenham, England, Natural History Society, Dr. E. T. Wilson, on Man and the Extinction of Species, are some historical notes on the disappearance of certain species in the British Islands. Within limited areas, the author says, species were not unfrequently eradicated before the use of firearms, as the beaver in England, which, though once common, was in the twelfth century only to be found in one river in Wales and one in Scotland; and wolves, which were practically exterminated in four years after the demand by Edgar for a tribute of five hundred heads annually from his Welsh subjects. "But even the introduction of firearms at first did little beyond giving man an increased advantage in his contest with the more formidable of the lower animals. Far otherwise is it, however, when man, the primitive hunter, gives place to man the tiller of the soil, man the cultivator, who fells forests, drains marshes, plows prairies, and in a thousand ways alters the face of Nature." To most of the larger quadrupeds, and to many birds, space is of vital importance, and space is being rapidly curtailed. The bustard, described by Bewick as common on the plains of Wiltshire, Dorset, and Yorkshire, has disappeared before advancing cultivation. The egret and the crane, once common in Scotland, are now among the rarest of visitors. Drainage in the broads and fens has led to the banishment of many former inhabitants, such as the grey lag goose, and in many parts the bearded tit. Between 1825 and 1855 the avocet, the bustard, and the godwit ceased breeding in Norfolk. About the same time the ruff became uncommon, and the bittern left off breeding regularly in 1850. Eagles and large hawks, such as the kite and the buzzard, and among mammals the otter and even the harmless badger, are becoming rarer year by year before the gun or the trap of the gamekeeper; while the trade collector, with his demand for whole clutches of eggs, contributes to the destruction of some of the rarer species. In 1893 an item was published that two sloops had visited the island of Foula in the Shetlands, the chief breeding station of the great skua, and carried off several dozens of the eggs, and there was reason to believe that not a single young bird was reared on the island during the breeding season of that year.

The Feigning of Death.—The probability of this phenomenon being a pure reflex, in most animals, is indicated by the following experiment on a currant moth, whose powers of "shamming" are so familiar, which is described in a recent letter to Nature by a Mr. Oswald H. Latter: "The moth was first seized by one wing, and it at once feigned death; thereupon its head was cut off with a pair of scissors, and the *animal continued to feign death*. I use the expression advisedly, for absolute immobility was maintained for some seconds and then violent fluttering

ensued, causing the animal to rush wildly about the table, but failing to lift it into the air. In this condition any impulse, such as touching or pinching, induced a repetition of 'shamming.' After a strong impulse the shamming was prolonged, and, indeed, a direct connection was obvious between the strength of stimulus and the length of period of quiescence. This power of response to stimulus was maintained for two days, and then weak fluttering set in for some hours, followed by death. We are forced, then, to conclude that here, at any rate, death-feigning is a purely reflex phenomenon, and that the sensory stimulus received by the surface of the body caused inhibitory impulses to arise reflexly from the ganglia of the central nerve chain, and prevented all movement of the locomotor muscles. In confirmation of this it may be mentioned that denuding the wing of its scales over any area caused a marked diminution of sensitiveness over the area so treated. Since all stages between sensory hairs and ordinary scales occur in *Lepidoptera*, it is not unreasonable to assume that the scales still function as tactile end organs in spite of their modification subserving decorative purposes."

MINOR PARAGRAPHS.

NAVIGATORS and other writers of the sixteenth and seventeenth centuries speak of a pretended art of controlling the winds which was claimed by Finnish and Lapp wizards, who sold wind in packages consisting of a cord with three knots. "If the first knot is untied," Grimm says, "the wind becomes favourable; if the second, a still better wind is secured; but a tempest inevitably follows the undoing of the third knot." Speaking of Greenland, Nightingale says: "The sailors of the north are so credulous that they often buy these magical cords; and they believe that, if they follow the instructions concerning the way of untying them, they will get whatever sort of wind they want." Like accounts are given by Leems and Scheffer; and the belief is referred to by Shakespeare in Macbeth.

A SUMMARY is published in the journal Himmel und Erde of reports made to the Bureau of Statistics in Berlin, which seem to show that cases of damage from lightning are regularly increasing. Thus while, according to Prof. von Bezold, the average number of accidents per year in Bavaria was thirty-two from 1833 to 1843, it has gone up from period to period till in 1880–'83 it was one hundred and thirty-two; and, while in 1855 one hundred and thirty-four persons were struck by lightning and seventy-three of them were killed, the number struck thirty years later was one hundred and eighty-nine, of whom one hundred and sixty-one were killed. The increase is ascribed to a variety of causes, among which are the use of electricity in industry; changes worked upon the earth's surface by the cutting away of woods, drainage, etc.; and the fouling of the air with coal smoke.

As presented by General Greely in a paper at the recent International Geographical Congress, arctic exploration has passed through three important phases. The first was a commercial phase, when the discoveries of Chancellor gave rise to the Muscovy Company and the institution of trade between Great Britain and Russia. The second was the geographical phase, which culminated in the beginning of the present century, and under which an unparalleled wealth of geographical results has been harvested. The third phase of scientific investigation has been prominent in later years, and now dominates, so that no expedition can command support unless its aim is scientific. Altogether, it can be proved that arctic industries have contributed some $12,250,000,000 to the wealth of the world.

HERR S. A. ANDRÉE presented his plan for a balloon expedition to the north pole before the recent International Geographical Congress. He advises that the balloon should be capable of carrying three persons, necessary instruments, and provisions for four months; that it should be so impermeable that it can be kept afloat thirty days; that it be filled somewhere in the arctic region, and be to a certain extent steerable. The start should be made in July, as early as the weather would permit, on a clear day with a brisk south wind blowing, so that it may go north quickly. The central and most inaccessible part of the polar region should be

aimed for. Besides geographical work, extensive meteorological observations should be carried on, all possible data collected, and the topographical outfit should not be forgotten.

M. CHARLES DUFOUR has found, from observations of the variations of refraction on the Lake of Geneva, that when the air is colder than the water the refracted ray is turned from the perpendicular, and that fine mirages like those of the desert are presented; while, when the water is colder than the air, the refraction is toward the perpendicular, and objects may be seen which are usually concealed by the roundness of the earth. Hence the horizon is usually depressed below the average in winter, and less so in summer. The author suggests that such variations may sometimes lead to errors in observations made at sea.

NOTES.

AT a ferry across the Yarkand River, which was crossed by Captain H. Bower during a trip to Turkestan, no rafts are kept ready, but when wanted they are made by the villagers from inflated skins and poplar poles. This raft is tied by a rope to a horse's tail; the horse is then driven into the water and guided by a man strapped to an inflated skin who swims alongside. "How our things got safely over," says Captain Bower, "has been a puzzle to me ever since. The raft was of the craziest description, and swayed about in the current, threatening to capsize every minute. All our things got wet, but no disaster happened, and nothing was missing when an inspection of our baggage was made in the evening."

A SATISFACTORY pavement has been made at Chino, Cal., with the refuse molasses of a sugar factory there. The molasses is mixed with sand to about the consistence of asphalt, and is laid on like an asphalt pavement. The composition dries quickly and becomes permanently hard, the heat of the sun only making it harder.

HAVING added to its collections during the past year specimens of the *eyra*, *yaguarundi*, the fishing cat of India, and the Bengalese cat, the Zoölogical Society of Philadelphia has now thirteen species of the cat family in its gardens.

MR. JAMES CONSTANTINE PILLING, bibliographer of the Bureau of American Ethnology, who died July 26th, made the study of the languages and literature of the North American Indians his life-work. Soon after becoming connected with the Geological and Geographical Surveys, under Major Powell, in 1875, he made himself very useful in collecting the vocabularies, myths, and legends of the tribes, and in the study and descriptions of their ceremonials. He retired from the survey in 1891, on account of failing health, and devoted himself to the study of the bibliography of American languages. He had published, at the time of his death, nine parts of his work on this subject, relating to as many languages or families of languages —a work which can not fail to be of great value to future students.

PROF. CHARLES V. RILEY, late chief of the Bureau of Entomology, died in Washington, September 14th, from injuries received while riding a bicycle. He was born in London in 1843, studied in France and Germany, came to the United States in 1860, and settled on a farm. He was afterward engaged in editorial work; served in the army during the last year of the civil war; and was appointed State Entomologist of Missouri in 1868. In 1877 he was made chief of the United States Entomological Expedition sent to investigate the Rocky Mountain locust. Later he was placed in charge of the entomological division of the Bureau of Agriculture. He was a prolific writer, chiefly of entomological monographs. He received a gold medal from the French Government for his investigation of the phylloxera, and a medal from the International Forestry Exhibition at Edinburgh.

M. H. BAILLON, the French botanist, who died July 19th, was the author of a Botanical Dictionary, and a History of Plants, which have become standard works in their own country. While he was not a member of the Academy of Sciences, he had been elected to the Royal Society.

ONE hundred and thirty-eight dollars have been contributed at Princeton University, through Prof. J. Mark Baldwin, toward the memorial to Prof. Helmholtz.

THE death is announced of Dr. Hoppe Seyler, for many years a professor in the University of Tübingen, and, since 1852, Professor of Physiological and Pathological Chemistry in the University of Strasburg. He was born in 1825.

PROF. LOUIS PASTEUR, the world-famous investigator of germ diseases and on those of the extended application of the system of inoculation as a remedy and preventive, died at his home near St. Cloud, France, September 28th. He had been in a low condition for some time as a result of the increasing paralysis with which he had been afflicted, but became suddenly worse on Friday evening, the 27th, and suffered much from frequent spasms until a few hours before his death, when he became unconscious. A biographical sketch of M. Pasteur was given, with a portrait, in The Popular Science Monthly for March, 1882 (vol. xx, p. 883).

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